THE METAL INDUSTRY
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD, COPPER AND BRASS, THE BRASS FOUNDER AND FINISHER AND
ELECTRO-PLATERS REVIEW

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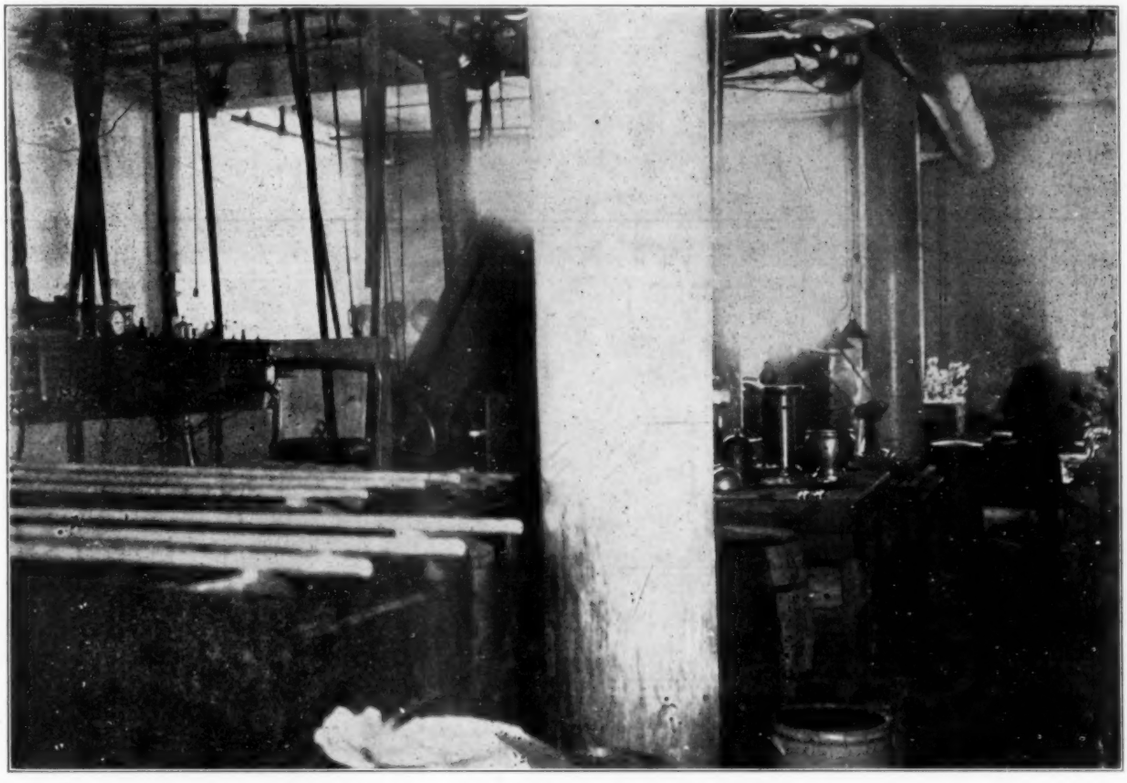
PLATING PLANTS IN HOTELS AND STORES

How the Modern Establishment Takes Care of the Repairs and Refinishing of its Metal Goods.

The average diner-out at our most up-to-date hotels or the shopper at our largest department stores has little conception of the complete system of machinery necessary for successful operation of the establishment. The diner gazes with satisfaction at the wonderful array of silverware deftly put before him by the expert waiter, but he rarely gives a passing thought to the care and attention necessary to keep the entire metal equipment of the hotel in such a marvelous state of perfection. The shopper in the store looks over the dazzling array of metal goods of silver, gold, bronze and copper tastefully arranged to tempt him to purchase, but he also does not realize the constant supervision necessary to keep the stock-in-hand in suitable shape for the purchaser's gaze. He does not realize, either, that should anything that he may purchase prove defective or need refinishing, the needed work can be and is rapidly and cheaply done on the premises.

All of our large department stores and hotels now maintain complete metal and glassware repair shops and plating plants for just this purpose. Our first photograph shows a view of the plating room of the R. H. Macy Company, New York. This plating room is part of the general repair plant of this large company on the eighth floor of the building. This entire department is under the able management of Mr. A. McDonald. In a room equipped with dynamos and motors manufactured by Zucker and Leavitt and Loeb Company, New York, foreman plater J. A. Straub with twelve men plated and refinished about 48,000 separate "jobs" in 1913.



VIEW OF PLATING ROOM AT R. H. MACY & COMPANY'S STORE, SIXTH AVENUE AND THIRTY-FOURTH STREET, NEW YORK.

In addition to the plating room the Macy company maintain a complete department for the repair of nearly every thing that is sold in the store in the way of metal, leather goods and glassware. Pocket books and satchels that have become worn or torn may be made over and

new metal parts are added. In fact any repair will be made that is considered worth while by the owner if the cost is not too excessive or does not approach too closely to that of a new article. A very interesting part of the repair work at Macy's is the way cut glass is handled. Macy produces some of their designs but most of the work done in the glass department is repair. A handsome cut glass carafé is brought with the neck broken. The glass cutter takes it, files off what is left of the neck, smoothes off the top of the bowl, cuts a few gashes in it to carry out the original design, and, behold, we have a fine flower bowl for the table center. A great cut glass vase for long stemmed flowers meets with an accident and the foot is broken off. The two edges are ground so that there is a close fit, special cement is applied and then a handsome silver band is put on and the vase is ready for another lease of life. Cut glass candlesticks are repaired in the same manner. There is also a very good business done at Macy's in eyeglass and spectacle manufacture and repair as well as the manufacture of gold decorated glassware and chine. Other stores in New York and other large cities have similar plants.

Tucked away on the twenty-third floor of the Hotel McAlpin, Broadway and Thirty-fourth street, New York, we find L. J. Kennedy, foreman plater, one of whose rooms we show in our second picture. Here in a completely equipped plant Mr. Kennedy patiently repairs and refinishes all of the derelict silver ware of the hotel. It may be a silver coffee pot minus a spout or a soup tureen that has had a fall, it is all the same to him, a new spout is put on the pot and the dent is smoothed out of the tureen, then both are replated and sent back for another period of service to earn their keep. Mr. Kennedy's equipment was furnished by the Hanson and Van Winkle Co., of Newark, N. J.

Down in the sub-basement of the Waldorf-Astoria Hotel, New York, near the wonderfully well equipped engine room of this great hostelry are a plating room and repair shop. This is probably the best fitted up shop in any hotel. A complete concrete built room is fitted with plating tanks of slate with the most up-to-date wiring system. Dynamos and motors manufactured by the Connecticut Dynamo and Motor Company of Irvington, N. J., ammeters and voltmeters manufactured by the Weston Electrical Instrument Company, Newark, N. J., complete the equipment. Here Matty Lowenthal, the plater, with ten men, in busy times keeps up-to-standard the enormous silverware equipment of the hotel. At the time of our visit the remains of a handsome silver chafing dish was brought in. A disgruntled waiter put out with the smallness of his fee after serving a party of "bon vivants" on the roof garden had thrown it down the elevator shaft! Battered and twisted out of shape it seemed fit for the melting pot but it was brought to the silversmith. He smoothed out the twists and dents and passed it on to "Matty" and his men and in an incredibly short time it was ready again to make a proud entrance to my lady's table with lobster a la Neuberg! We regret that fire insurance restrictions prevented our getting a picture of this most interesting underground installation at the Waldorf-Astoria. Although Chief Engineer Bingham was entirely agreeable the fates were against us and we have to be content with a description. Other hotels in New York that maintain similar plants are The Knickerbocker, Broadway and 42nd street; Astor Hotel, Broadway at 44th street; The Plaza, 5th avenue at 59th street; Marie Antoinette Hotel, Broadway at 66th street; Ritz-Carlton, Madison avenue at 46th street, and the Vanderbilt, Park avenue and 34th street. The Bellevue-Stratford at Philadelphia also operates a plating department.

PLATING ROOM AT HOTEL McALPIN. ONLY HALF OF PLATER KENNEDY CAN BE SEEN AS HE WAS TOO MODEST TO GET INTO THE LIMELIGHT.

THE SCHOOP METAL SPRAY

A Revolutionary Application of High Temperature and Pressure.

A short time ago in a New England plant we observed some singular phenomena of interest and importance to our readers.

Into one side of a three-inch cubical box held in the hand a cold metal wire on a reel was being pulled continuously and uniformly at a rate of twelve feet a minute, while at the mouth of a short nozzle on the opposite side of the box there issued a continuous hot blast carrying entrained in it, with a velocity of about 3,000 feet a second, a very fine spray of molten metal.

On the lid of the little box being raised it was apparent that the wire underwent no physical change in its passage through it, the mechanism in the box consisting wholly of an ingenious air-driven feeding and wire-straightening device which fed the metal through the box into the nozzle core. The wire remained cold and unaltered until it was about one-eighth of an inch from the nozzle and there it underwent the extraordinary transformation above described. While the phenomena of instantaneous atomization and projection of metal were naturally astonishing to the beholder, the properties of the flying molten particles were even more wonderful.

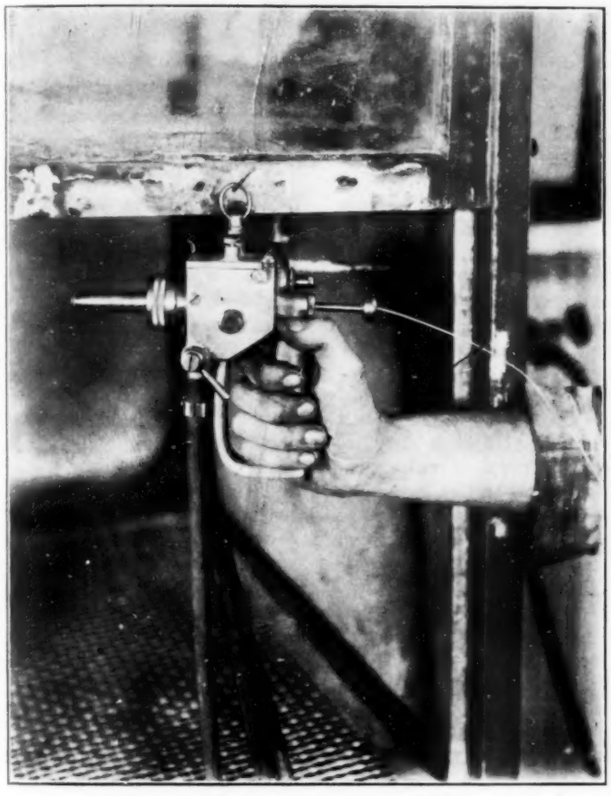


FIG. 1. SCHOOP PISTOL READY FOR ACTION.

THE ACTION OF THE METAL SPRAY.

The nozzle of the box was pointed from a distance of five inches at the surface of various objects of metal, wood, paper, stone, clay, cement, cloth, silk, glass and other substances and in every case the surface receiving the spray became coated with a dense adherent film of the metal composing the wire fed into the apparatus. Elemental and alloyed metals were handled with equal facility. Lead, tin, zinc, aluminum, copper, brass, bronze, German silver, etc., were fed into the instrument at will and deposited freely in coatings from .001-in. upward in thickness.

The temperature of the molten metal spray at the nozzle varied according to the wire used from 700 degrees Fahrenheit to 2,000 degrees Fahrenheit, yet five inches away none of the objects coated were injured or altered in the act of metallizing them. Matches held in the zinc spray were immediately coated over without ignition, and the thinnest paper and wood received the impacting particles into their pores without charring. Brass issuing at 1550 deg. F. from the nozzle was deposited on the thinnest silk fabrics without damaging the textile. These extraordinary results by such simple means

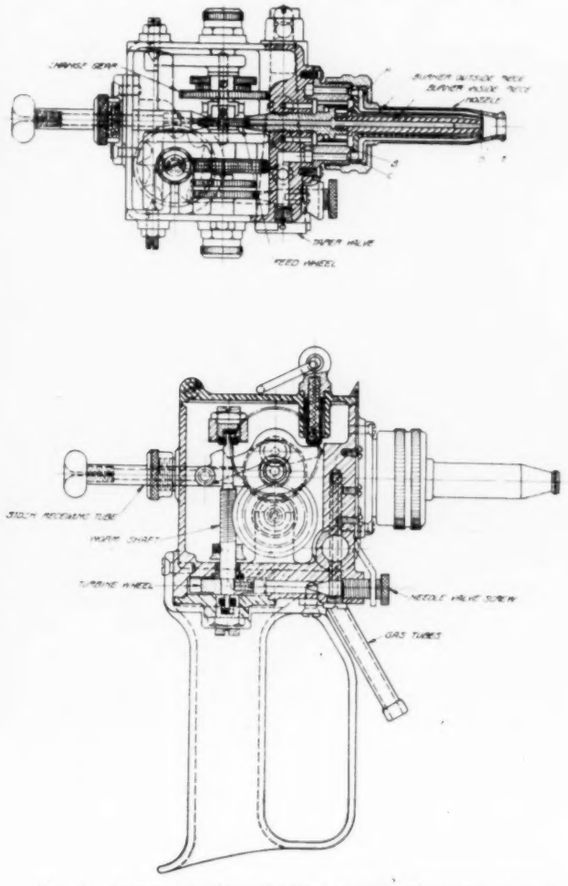


FIG. 2. DIAGRAMATIC VIEWS OF THE SCHOOP PISTOL.

awaken the highest interest and immediate commercial applications of the Schoop Process suggest themselves by the score to the observer. The instrument already described is not a scientific curiosity but a thoroughly practical plant tool well designed and executed and in daily service in numerous plants.

PRESENT STATE OF THE COATING ART.

Despite a rapid advance during the past decade in our knowledge of the internal structure and characteristics of metals in all physical states and a general desire for the conservation of our mineral resources, the steel and iron structures of the engineer and manufacturer remain to a very large extent a prey to corrosion and the art preservative has lagged behind.

The electro-plating bath, while coating more or less successfully a large amount of metallic hardware with nickel, copper, silver or gold, greatly limits the size of the articles handled. It exposes steel and iron to injurious moisture and chemicals, is unable to deposit the commoner stable and protective metals lead, tin, aluminum and zinc and their numerous alloys, and is of no value towards the protection of the larger industrial products.

The stable metals have long been desired in the form of thin adherent protective coatings not only on other metals but also on many coherent substances used in the arts such as wood, paper, leather, glass, stone, cement, textiles, etc., but no practical solution of the problem has been furnished through electrical deposition.

The electrical fusion of copper dust sprinkled over non-conducting surfaces has been accomplished for purely decorative purposes but this expensive process of limited scope, with one metal only, has no economical application.

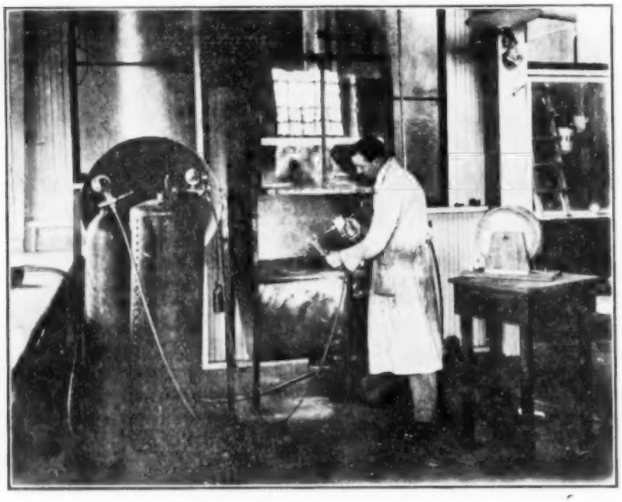


FIG. 3.· COATING A WOODEN PATTERN WITH METAL BY THE SCHOOP PISTOL.

Two other processes dealing with a single metal—zinc—occupy the field today. A large quantity of iron and steel receives a purely temporary coating of that protective metal by the wet galvanizing process and a much smaller quantity of metal is more effectively coated by the dry galvanizing method known as "Sherardizing" conducted at high temperature; the various chemical processes for obtaining "finishes" need not be considered here.

The above methods so narrowly restricted in the choice of coatings and using objectionable temperature, moisture or chemicals and unaccommodating apparatus have greatly restricted their field of application and for the protection of structures and apparatus in general the engineer and manufacturer have still to rely mainly upon the temporary arrest of decay afforded by paints, enamels and their substitutes. There is in this steel age no more serious practical problem than the effective application of non-ferrous metal coatings in the prevention of the decay which awaits our most essential structural metals.

THE METAL SPRAYING "PISTOL."

Fig. 1 is a photograph of the "Pistol" ready for action. The three hose pipes lead oxygen, hydrogen and air from their respective containers to the burner tube and blast nozzle, which are concentric. The geared air turbine and friction wire feed wheels are also visible in the cut.

Provision is made for ready control of the gases. Fig. 2 shows the latest American instrument in plan and section. As already indicated the small box accommodates only the feed apparatus and the gas and air leads; the whole action of melting, pulverizing and projection taking place at one spot just inside the blast nozzle.

The wire is fed down the core of the inner burner piece and at the end of it passes into the flame zone due to the ignition of the mixture of hydrogen and oxygen, which simultaneously passes between the two burner pieces. Immediately in front of the flame zone the nozzle discharges a violent blast of air completing the disintegration of the wire and causing its particles to be entrained in an expanding blast of gas and air.

Fig. 3 shows the "Pistol" being used to cover a wooden pattern with brass. Tanks of commercial oxygen and hydrogen with reducing valves and a supply of compressed air are the only requisites for operating the pistol on any metal in the form of wire.

THE THEORY OF THE SCHOOP PROCESS.

In considering what occurs in the Schoop process it is necessary to bear in mind a singular fact: the sprayed metal moves only six inches between its points of fusion and the object to be coated, yet it does *not* reach the object in a molten state. It even possesses so low a temperature that it can be safely directed upon the hand for a moment without injury and can be continuously impacted upon materials such as cloth, paper, wood and even celluloid, which would be immediately consumed by the heat of any molten metal. A box of matches can be coated all over to form a seamless metal case without a single match being ignited.

The reason is that the gaseous medium used is much larger in volume at any moment than the drop it has pulverized and is carrying and the gas is expanding so rapidly that its temperature is far lower than that of the spray. A rapid exchange of heat therefore takes place between them which consolidates the molten particles and gives them a temperature far below the melting point. If the particles arrived in a liquid state at the base with the observed velocity of 3,000 feet a second they would simply splash on the plate and largely rebound. As a matter of fact they impact and inter-penetrate freely and the later bombarding particles unite with the earlier ones to form homogeneous compact bodies. In accounting for the observed action of the Schoop spray at the receiving base, it is supposed that the cooled particles of metal just before impinging with great velocity on a hard surface are in an abnormal physical condition. Due to the heat of collision they pass directly into a vapor which condenses and solidifies on the relatively cold receiving body, penetrating by osmotic pressure the superficial pores of the base where any affinity for the latter exists and, otherwise, driven in by the pressure behind it.

In either case it condenses and solidifies after penetration and is effectively dovetailed into the base. The hammering and bombardment of the solidified first coat by the minute succeeding particles is practically a process of cold working. The entrained particles liquefy and solidify so rapidly that the metal has not time to return to its natural crystalline state. The theory just outlined seems to be supported by examinations of the sprayed deposits, for the structure of the metal coatings and of the whole bodies produced by the Schoop process is always found to be amorphous and vitreous throughout. This characteristic is of great importance to many large metal industries.

COST OF SPRAYING WITH THE PISTOL.

The cost of operating the Schoop process in the United States has been carefully ascertained through experience

with the appliance during the last six months. The seven metals most commonly used for protecting or decorating surfaces are lead, zinc, aluminum, brass, German silver, bronze and copper. When the gases are purchased in small quantities in the usual containers, the cost of spraying lead including the cost of wire, compressed air and labor, is between one and two cents a square foot and one pound of lead can be sprayed in less than a minute. The other metal coatings vary with the initial price of raw material and its relative hardness.

Where concerns operate a number of pistols they usually generate their own gases or purchase them on a wholesale basis thereby effecting considerable saving in the cost of operating the process.

APPLICATIONS OF THE PROCESS.

The dense adherent coatings made by the Schoop process have been applied in many directions. Unlike all other existing processes, there is no need to subject the whole of an object or structure to the coating. Any part, however small, can be metallized alone with any one of a dozen metals.

Three main lines of application have been developed so far, but at that the ground has only been scratched.

1. To preserve from decay in the atmosphere or from moisture or any form of chemical action objects of any coherent substance including wood, paper, stone, cement, etc., and particularly objects and structures of our essential but vulnerable metals, cast iron and steel, in every variety of their use in the arts. This alone is an immense field.

2. To decorate all or any part of any object of any metal or of any coherent substance.

3. To copy in metal by means of the detachable sprayed coatings obtainable with the pistol any metallic, cement or composition object.

The Shoop process and pistol as developed in England were described in THE METAL INDUSTRY for October. The process and apparatus described above differs from the European as the "Pistol" has been considerably improved in this country. These improvements and the United States rights are owned by the Metals Coating Company of America, Boston and Chicago, who already possessed the basic patents which controls the impacting of metal irrespective of the nature of the apparatus used.

EPICASSIT

A RECENT GERMAN INVENTION FOR COATING IRON AND STEEL WITH TIN, LEAD, ZINC, ETC., BY PAINTING AND EXTERNAL HEATING.

BY CHARLES H. PROCTOR.

Epicassit is a recent German invention for coating iron or steel with pure tin, tin and lead or a purely rust-free coating of tin, lead and zinc. It consists of a very finely powdered metal which is mixed with an oil that acts as a flux. It is painted upon the metal surface in the ordinary manner with a brush and then heat is applied to the surface until the applied metal melts when it becomes thoroughly amalgamated with the surface metal producing an extremely firm and durable coating.

Epicassit does not run when being melted, so that articles of any shape or size, in any position, can be treated without being dismantled or removed from their permanent positions.

This is one of the great advantages of Epicassit. The material will fill a distinct field and will prove of much value in the metal trades. It will enable anyone to coat a metal surface with tin or its alloys in a very efficient manner and is as economical as the older method of immersing in molten metal. Manufacturers who have occasionally to coat articles with tin or its alloys will appreciate the value of the material as no special apparatus is required or special workman needed to produce results with the method.

Epicassit comes in several alloys, but the same oil flux is used for all.

A. Grade consists of pure Banca tin, guaranteed free from lead.

B. Grade alloy consists of two parts tin and one part lead.

C. Grade alloy consists of two parts lead and one part tin.

(C.1) Grade consists of 95% lead and 5% tin.

E. Grade consists of 35% tin, 15% lead and 50% zinc; this grade produces an entirely rust-free protective coating for articles of iron and steel.

These various grades enable the manufacturer to coat articles with any protective coating desired, from pure tin to a combination of tin-lead and zinc without any special plant. Hundreds of manufacturers in Germany are using the material. Every plumber in the United States will appreciate the value of the material. Because of the simplicity of application it will enable them to do work that heretofore they would have to refuse because of not being properly equipped to coat articles to be retinned or coated with the other alloys mentioned.

Grade A can be used where any article or part is desired to be tinned. Parts of machinery used in producing articles of food, milk cans, dairy and brewery machinery, drinking water receptacles, heating and cooling tubes, and apparatus of all sizes in breweries, bakeries, meat packing, fruit preserving, candy making utensils and machines.

Grade B.

For any articles that come in contact with food products, for tinning bearings, as a solder for switchboard and overhead trolley connections in electric railroad operations.

Grade C.

For parts of accumulators as a protective coating against acid fumes, iron and steel window frames, textile dyeing, printing, bleaching and spinning mill machinery, and parts can be coated to advantage as well as calenders in paper mills.

C1. Grade.

For any articles previously coated with lead gives a protective coating for metal parts coming in contact with acids equal to pure lead.

E. Grade.

Gives a more perfect protective coating than any form of galvanizing against oxidation and sea water. It is particularly recommended for galvanizing articles which are to be bent, stamped, cut or corrugated. An absolute rust protective coating for bridges, cranes, etc. When "E." Epicassit is applied before assembling, girders, plates or any other surface can be coated in or out of position. Its advantages are enumerable over any method now in vogue for the purpose of coating metals from an external source.

Epicassit is now obtainable in this country from Hess and Son, 1031 Chestnut street, Philadelphia, Pa.

MODERN DIE-CASTING PRACTICE*

A Description of the Salient Features of the Production of Finished Metal Castings.

By Charles Pack.†

Die-castings may be defined as finished castings, the metal having been poured and allowed to solidify in permanent metallic molds. This definition would include a number of casting processes, the products of which are not commercially recognized as die-castings, such as the casting of cheap lead figures, lead battery plates, dental appliances, etc. Here the molten metal is poured from an iron ladle into a permanent metallic mold, filling the mold by its own gravity and using no external pressure. To exclude these processes, die-castings must be defined as "finished castings made by pouring molten metal under pressure, into a metallic mold."

The process of die-casting consists essentially in melting the die-casting alloy in a suitable container and forcing it, under pressure, into a metallic mold or die, producing smooth finished castings requiring little or no machining and being ready for buffing or plating without any grinding or cutting down. The process is best adapted to small intricate parts where accuracy and uniformity are essential. The process is limited to a group of alloys (described under the metallurgical phase of the industry) having a tensile strength not exceeding 20,000 pounds per square inch., which limits the application of this process to machine parts not subject to severe strain or shock. It is, however, possible by a careful study of the service conditions to redesign castings, either by the addition of ribs, webs, fillets, etc., or by the insertion of steel or bronze inserts to so strengthen die-cast parts that they may successfully displace the stronger alloys of copper and iron.

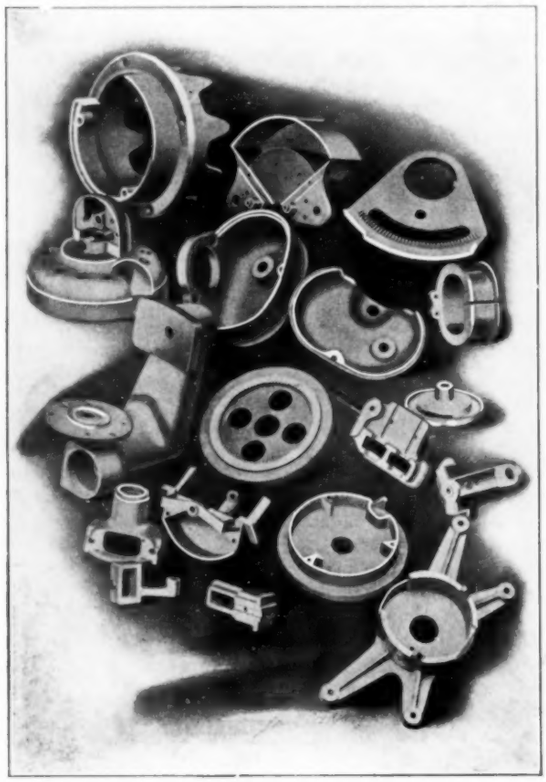


FIG. A. SOME "DOEHLER" ALLOY DIE CASTINGS USED FOR AUTOMATIC DEVICES, METERS, ETC.

Although the principles of die-casting have been known and practised for many years, the advent of successful die-casting as an individual industry dates back to a casting as an individual industry dates back to a period of no more than fifteen years. By careful study and experiment it has become possible to enlarge the area of its application and at the present time the manufacture of die-castings forms an important branch of the non-ferrous metal industry.

Die-castings are now used extensively for both useful and ornamental purposes. They constitute the vital parts of various types of automatic vending machines, photographing machines, typewriters, cash registers, magnetos, motor starting devices, time controlling devices, counting machines, water circulating and force feed pumps, player pianos, roller and ball bearings, connecting rod and crank shaft bearings for internal combustion motors, gas meters, electrical measuring devices, mechanical and electrical horns, phonographs, and for many other purposes too numerous to mention here. Figs. A, B and C show a number of die-castings used in some of the above-named devices.

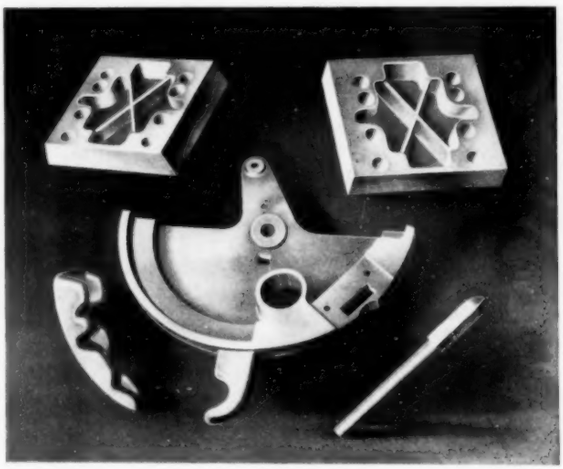


FIG. B. ALUMINUM DIE CASTINGS USED IN AUTOMATIC MACHINERY.

DIE-CASTING PROCESSES.

The processes in use for the manufacture of die-castings may be divided into two groups, viz.:

(A) Air Machines. (B) Plunger Machines.

In the air machine the metal is melted in a suitable iron pot fitted with air-tight cover. To make a casting the air valve is opened to admit air, which forces metal upwards into the die. Although there are a number of air machines where metal is poured downward with gravity, the greater number called to the attention of the writer force the metal upward and against gravity.

The plunger type of casting machines, although open to a number of objections, have proven more successful in practice and are used to a much larger extent than the air machines. The writer, in this paper, will confine him-

*A paper presented at the Annual Meeting of the American Institute of Metals, September 7-11, 1914, at Chicago, Ill.

†Doehler Die Casting Company, Brooklyn, N. Y.

self to a discussion of the "Doehler" machine and process patented by H. H. Doehler in 1907. This process, which is undoubtedly the best of either type, is now being successfully used in all parts of the United States, as well as in Canada, Great Britain, Germany, Austria and Hungary. A diagram of the machine is shown in Fig. D.

The cast iron pot, A (Fig. D-1), holding approximately

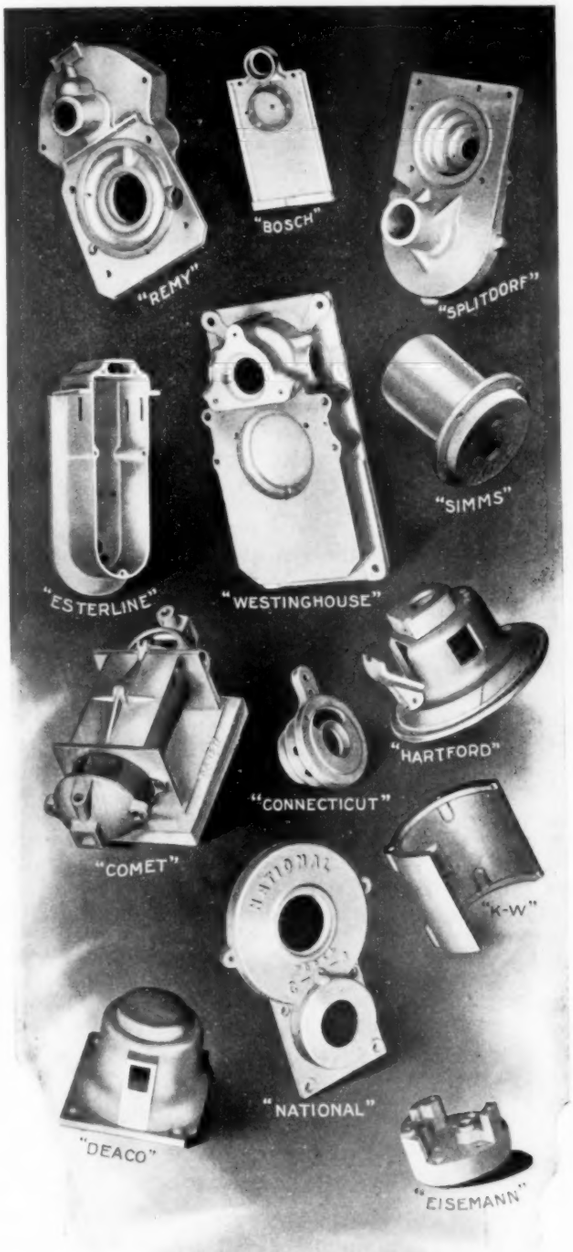


FIG. C. SPECIAL DOEHLER ALLOY DIE CASTINGS USED ON VARIOUS TYPES OF MAGNETOS.

500 pounds lead, is fitted into gas furnace B. The cylinder C is completely immersed in the molten alloy. The piston G is attached to arm M-2, to which is fitted lever M-3. In diagram, lever M-3 is raised to its maximum height, allowing the metal to flow into the cylinder bore through valve F. The downward movement of lever M-3 forces piston G into cylinder C, automatically shutting off valve F and forcing metal content of C through male nozzle D. The die (which is divided into two parts U and V) is fitted firmly to frame N and N-3, which hinges over so that female nozzle N-2 fits securely over male nozzle D.

To make casting, both halves of die are locked together securely by means of toggle Q. Frame is then turned through an angle of 90 degs., which brings nozzle N-2 in contact with nozzle D. The two are locked together securely by means of two toggle locks shown in Fig. D-7.

To a cutter which passes through "gate" a lever is attached which acts as a shut-off for metal since it will be seen that metal is forced upward and against gravity. When lever M-3 is brought down forcibly, metal in cylinder C is forced through nozzles D and N-2, into die U and V. As soon as lever M-3 completes downward stroke, operator forces cutter through "gate" of die, which acts as a lock preventing metal from "running" back into pot. Frames N and N-3 are water-cooled. The machine requires three operators, but the operations are rapid, the maximum capacity being 230 operations per hour.

Fig. D-3 represents a side view of the piston showing groove for attaching to plunger arm M-2. Fig. D-4 rep-

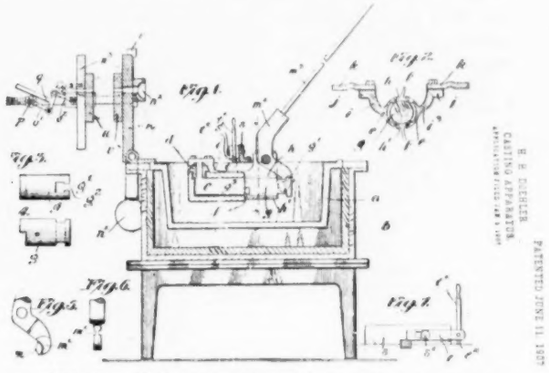


FIG. D. THE DOEHLER DIE CASTING MACHINE.

resents another view of plunger showing groove G-3 which forms part of valve F. Figs. D-5 and D-6 represent side and end views of plunger arm M-2, showing lugs for holding piston. Fig. D-2 represents cross-section of cylinder and piston and further demonstrates the working of valve F.

CONSTRUCTION OF DIES.

Dies are constructed from model or blueprint furnished. The design and construction of these dies constitutes one of the most vital factors in the successful operation of the process. The designer of the die must find the proper location for the gate, which is a very important factor, far more so than in foundry practice. In many instances he must entirely redesign the parts to conform with the process and counteract the deficiencies of the die-casting alloys to which the process is limited. A machine part often pronounced a casting impossibility may be made a possibility by the ingenuity of the die designer. Careful examination of Figs. A and B will reveal castings with both internal and external threads as well as undercuts which have been cast finished by the use of collapsible and detachable die parts.

A better understanding of the importance of the die construction may be gained by a consideration of the die

cost. Dies for simple parts may cost from $25 to $100; for more intricate parts from $100 to $500, and for very complicated parts die cost may run as high as $1,000. Although the latter figure seems high, die castings made from such die still show big savings, since otherwise there would be no demand for such dies.

The predominating features of die castings are their high degree of accuracy and uniformity. Die castings can be made to specifications of plus or minus .005 inch, and when necessary, if conditions permit, to specifications of plus or minus .0005 inch. These conditions depend upon the alloy to be used and construction of die. Generally, specifications of plus or minus .0005 inch can only be had on castings whose dimensions do not exceed one inch either way. It must, however, be understood that closer specifications require more careful die work and consequently higher die cost. Limitations should therefore be made as liberally as requirements will permit. From the foregoing it will readily be seen that in the construction of dies only high skilled mechanics can be employed. The employment of inferior labor in this department would be a false economy, since a single misstep may ruin weeks of good work.

DIE-CASTING ALLOYS.

The alloys used for die-castings may be divided into three groups, viz.:

A. Zinc Alloys: These alloys usually contain from 70 per cent. to 90 per cent. zinc alloyed with varying proportions of tin, copper, aluminum and less frequently antimony and lead.

B. Tin Alloys: Containing 60 per cent. and upward of tin alloyed with varying proportions of lead, copper, antimony and zinc.

C. Lead Alloys: Containing 60 per cent. and upwards of lead alloyed with varying proportions of tin and antimony.

ALLOYS OF GROUP A.

The writer in his experience has found the constituents of these alloys to vary as follows:

	Per Cent.
Zinc	70 to 90
Tin	0 to 20
Aluminum	0 to 5
Copper	2 to 5
Antimony	0 to 2
Lead	0 to 2

A typical example of this group of alloys is the following:

	Per Cent.
Zinc	84.5
Tin	9.0
Copper	4.5
Aluminum	2.0

The frequent extravagant claims of some irresponsible die-casting producers as to the physical and chemical properties of these alloys have in many instances led to confusion and financial loss which has prejudiced some manufacturers against die-cast products. Claims that "our alloy is as strong as brass" have a number of times been called to the attention of the writer, who, on investigation, found them to have been made for a zinc alloy of the type given. That such claims are made can only be attributed to the workings of a fraudulent or otherwise disordered brain. Like all useful commercial improvements, zinc alloy die-castings have numerous advantages where applicable, but cannot entirely displace sand castings for reasons the writer will try to point out in this paper. From the foregoing it will readily be seen that in considering the advisability of using die castings it is most important to first consult with a reputable manufacturer who will recommend their use only if sanctioned by his staff of engineers and metallurgists and one who will not allow greed for financial gain to influence his judgment and advice.

Zinc alloys of the type given have a tensile strength not exceeding 18,000 pounds per square inch, and an exceedingly low elongation and reduction of area. The strength of these alloys compares favorably with cast iron. Zinc alloys are corroded by aqueous solutions of any kind and should not be used for food containers or conveyors. Gasoline, which theoretically should be inert toward metals, has been found in practice to corrode zinc alloys, when in direct and constant contact, due to impurities in the commercial gasoline sold to motorists. A good copper-plating, however, will aid a zinc alloy to resist the action of gasoline.

Zinc alloy die-catsings may also be plated with nickel, silver, brass, etc., and such coatings protect the castings from corrosion. Zinc alloy die-castings may be buffed to a beautiful white polish, which, unfortunately, becomes dull upon exposure to atmospheric conditions for a few days. A permanent white polished surface may be imparted to zinc die-castings by electro-plating with nickel and buffing.

Of all die-castings produced in this continent and in Europe, approximately 85 per cent. are made from zinc alloys, 10 per cent. are made from tin alloys of Group B, and 5 per cent. from lead alloys of group C.

A better understanding of the extensive application of zinc die-castings to the various arts of manufacture may be gained by a partial description of the parts for use in the motor vehicle industry, which is undoubtedly one of the largest and most important, as well as the most progressive industries in this country at the present time.

MAGNETOS.

Die-cast magneto housings, switch locks, switch handles, etc., have been used for many years and can now be found on many of the high-priced cars. The housings are usually given a black copper sulphide (oxidized copper) finish and other parts are usually nickel plated.

SELF-STARTING DEVICES.

Many makes. Castings sometimes used uncoated while exposed parts are usually given copper sulphide coating.

WATER-CIRCULATING PUMP BODIES.

Now being successfully used on high-class motors. Castings usually used without coating.

FORCE-FEED OIL PUMP.

Have been successfully used for many years by one motor car company producing over 50,000 cars annually.

BALL-BEARING CAGE.

Castings used uncoated and give good results.

SPEEDOMETERS.

Used practically on all makes since their introduction.

WING NUTS FOR WINDSHIELDS.

These have been found to give good service and present a good appearance when nickel-plated.

Besides the instances cited above, zinc alloy die-castings are used in the numerous motor accessories being devised continually. Many of the inventions patented annually would not be commercial possibilities if the present-day zinc alloy die-castings were not available. The numerous automatic vending machines on the market today illustrate this fact.

ALLOYS OF GROUP B.

This group may be said to consist entirely of "Babbitt" metals. The term "Babbitt Metal" has been so abused that it is difficult at the present time to confine the name to any specific limitations. The original tin, antimony, copper alloy patented by Isaac Babbitt has undergone numerous changes. Constituents have been varied, lead and zinc have displaced the higher-priced tin in many cases, and at the present time any white metal alloy used for bearings is usually styled "Babbitt Metal." Die-castings of this group are mostly used for motor bearings, although they are also used for machine parts where resistance to corrosion is of major importance and where high tensile strength is not required.

The die-casting process is ideal for producing babbitt bearings. Such bearings are now used by all large motor car manufacturers. In the die-casting process the metal is poured under pressure into a water-cooled metallic mould. The rapid chilling produces a close-grained babbitt bearing, free from blows and dross spots, so often encountered in the place-poured bearing. An automobile concern producing 50,000 cars per year have used successfully die-cast bearings for eight years without a single complaint, and many die-cast bearings on that particular make of car have traveled 50,000 miles and more only requiring slight adjustment occasionally. The alloy used by this company is of the genuine babbitt type, i. e., containing only tin, copper and antimony in proportions varying only slightly from the original babbitt formula. The die-casting company producing these bearings use only primary "Straits" tin, "Cookson's" antimony and the finest drawn or rolled "Lake" copper. This alloy is mixed by a process in which no constituent is heated above 750 degs. F., and after mixing it is kept below this temperature until cast. Die-cast bearings made in this manner are far superior to those cast in place around the shaft and also more economical.

Under this group of alloys mention must also be made of Parson's White Brass, an alloy of tin, zinc and copper. This alloy cannot be cast in the plunger type of machine (due to freezing of plunger), and only with difficulty in the air machine. The alloy, although partially molten at 400 degs. F., is not thoroughly fused and entirely liquid until a temperature of 1000 degs. F. is reached, at which temperature the alloy drosses excessively, segregates easily and is in general a poor die-casting alloy. There has been, however, a demand for die-castings of the tin-zinc copper type and this has caused the placing on the market of a bearing metal known as "Comet White Bronze," an alloy consisting essentially of tin, zinc and copper, in such proportions and treated in such manner as to overcome the objections to which Parson's White Brass is open to although retaining its good bearing qualities.

ALLOYS OF GROUP C.

These alloys are so well known as to require no further discussion here beyond saying that the die-casting process is not limited to any particular composition and is applicable to all alloys of this type.

BRASS DIE CASTING.

The production of brass and aluminum die-castings has been the fond dream and ambition of all die-casting producers. At various intervals enthusiastic theorists have arisen with the shout "we have it," and claimed to make brass die castings, only to find that some little, insignificant detail upsets their entire process. At the present time the commercial production of brass die-castings is as much an impossibility as it was fifty years ago. In making this statement the writer is fully aware of the claims made by a Western manufacturer that "We have successfully overcome the heretofore insurmountable difficulties resulting from the very high temperatures at which the yellow metals must be worked."

The writer has participated in years of experimenting along these lines at an enormous expenditure of time and money and has come in contact with the obstacles in the path of brass die-castings, some of which are insurmountable at the present time.

Following are a number of reasons why brass die-castings cannot be produced commercially:

1, COMPETITION. The writer has seen produced brass die-castings of small machine parts, but due to advances that have been made in modern foundry and machine shop practice, these castings could be made cheaper when sand cast.

2. ACCURACY. Modern automatic moulding machines, automatic screw machines, etc., make it possible to produce small brass castings accurately machined at a comparatively low figure. In order to compete, brass die-castings must be made rapidly, must be accurate to within at least plus or minus .002 inch, and must have smooth finished surface. The expansion and contraction of the metallic moulds used make accuracy impossible.

3. Although it is possible to make brass die castings by forcing molten brass into a metallic mould, it will be found that after 500 or 1,000 castings have been made the mould will crack or warp, necessitating the construction of a new die, which is usually very expensive.

From what has been said it will be seen that in order to produce brass die-castings commercially two materials must be available. They are:

A. Die-casting brass alloy having a shrinkage on solidification of not more than .004 to the inch.

B. Die material must be poor conductor of heat, have practically zero coefficient of expansion, chemically inert towards brass, unaffected by white heat, as strong as a good grade of machine steel, at a red heat, and easily machinable.

Until such materials are available, the writer is of the opinion that any attempt to die-cast brass is merely an extravagant and wasteful expenditure of money and time.

ALUMINUM DIE-CASTINGS.

The die-casting of aluminum alloys shows more promise of becoming a permanent industry. Some very complicated aluminum die-castings, some of which are shown in Fig. B, are being produced. The writer is not at liberty to discuss either the process or alloy used, since patents are pending for both, but hopes to discuss this new branch of the die-casting industry at a later date.

CONCLUSION.

In the foregoing article, the writer has endeavored to describe the die-casting process and mainly its relation to the non-ferrous metal industry. The annual consumption of non-ferrous metals by one large concern for use in die-castings, is approximately the following:

	Pounds.
Zinc	3,000,000
Tin	1,750,000
Lead	1,050,000
Copper	225,000
Antimony	385,000
Aluminum	205,000

The writer has omitted any detailed description of the die construction, since this phase of the industry has been fully described in various mechanical trade journals.

HEAVY CHEMICAL CONDITIONS IN EUROPE

AN AMERICAN IMPORTER REPORTS UPON HIS HURRIED TRIP ABROAD IN SEARCH OF CHEMICALS USED IN THE PLATING AND FINISHING TRADES.

BY E. R. MURPHEY.*

I have just returned to New York from a visit of five weeks to European countries. The greater portion of this time was spent in an effort to investigate the business conditions existing abroad concerning what are known as "heavy chemicals" such as cyanide of potassium, caustic potash, vienna lime, pumice stone, magnesium sulphate (Epsom salts), etc.

Believing that my experience would prove interesting to those who are dependent upon these chemicals for the operation of their factory and the manufacture of their products I have jotted down some of my discoveries.

There is in England at the present time absolutely no cyanide of potassium to be had in any appreciable quantity, what little there might be lurking in odd quarters was held at a price of thirty-one cents per pound by the jobbers. The English government has ordered manufacturers of cyanide to sell all that is needed for the purpose to the gold workers of Africa in order that the supply of gold shall continue to flow towards England and in this way provide for carrying on the war.

Vienna lime, which is used as a polishing and cleaning material, is not to be had in England, as this all comes from Germany, and when I interviewed a manufacturer of this material in Germany, while he would make no definite promises that he could let me have any, he hoped to be able to furnish me with some at five pounds per ton, or over twelve cents per pound, while the original price was from two and a half to three cents per pound.

The situation regarding caustic potash is equally as intense and none is to be had from the other side while the price on this side has risen from five cents a pound to thirteen cents, but, of course, a good deal of caustic sodium is taking its place.

So much for the general situation regarding chemicals. Supposing that there are some stocks of chemicals which it might be possible for one to purchase the following difficulties are in the way of actual business transactions.

First: It is impossible to obtain firm offers on anything in Germany, and you must pay cash in advance for the goods before they are removed from the warehouse or shipped from the works. The manufacturer takes this precaution because if the car holding your merchandise should be wanted by the military authorities for the movement of troops, merchandise will be dumped, and it is exceedingly difficult to find out where your material is. River traffic has practically ceased, and only half the number of trains are running owing to scarcity of coal. Last year Germany paid England six million dollars for coal, and today, of course, she is not getting a pound. Only every fifth street lamp in Hamburg is lit, and outside of Berlin great economy of coal is practiced.

I made it a point during the two weeks I was in Germany to visit not the office but the works in all parts of Germany, as Dusseldorf, Cologne, Munich, Berlin, Hamburg and some smaller cities, and I found that only one out of five were actually working, the rest were shut down, both for lack of men, lack of coal and lack of shipping facilities. The English are holding all mail addressed to Germany in England, that is sent via Rotterdam. In addition to that, German exporters who have sent goods to Russia, England and France, have had these drafts, which they have already discounted and received the cash on by the bank, returned to them unhonored, and the banks have demanded that the cash be returned to them.

We have been endeavoring to sell all merchandise for import and I realize this is a difficult thing to do, because even if you buy goods for immediate shipment from the interior of Germany, it takes at least two weeks before they are shipped, and it takes another two weeks even if the boat sails the same day for New York. All cables sent to England, Holland, Italy or any European country, which contain any German word are immediately killed by the censor, and you are not notified until you have paid for them. For instance, a cable from the New York office to me at London advising that an American firm had received a shipment of oxalic acid, was never received by me.

On two different occasions I was officially summoned by the British Government to present myself under penalty of arrest if I refused, at the office of the Censor on Broad street to explain why I persisted in sending code words like "Metol" and other chemical terms. When I went to Rotterdam and suddenly decided I must go to Germany, I cabled Mrs. Murphey in London to that effect. The next morning a burley Scotland Yard detective called at the hotel and insisted upon forcing his way into the apartment, and subjected Mrs. Murphey to all kinds of questions, as to who she was, who I was, and at the same time giving her no information until she was under the opinion that I had been arrested as a spy, as the papers were full of stories of spy arrests. Every letter arriving in England is opened by the Censor, and you can see how closely they are watching everything. Any Englishman who is found doing business with the Germans is sentenced to two years' imprisonment.

There seems to be a wrong idea in the minds of some people that this war is of short duration. Both sides are very strong and very confident and England and Germany feel that they are fighting for their very existence, and there is no question but that it will last for another year. There seems to be no ill-feeling in Germany against France, all the feeling is directed against England. England has about two hundred thousand soldiers in the field against two million in France, who are putting up a good fight. The press despatches are censored by the English, and we only get one side of the story. This is going to cause some people to lose money, for they need not expect that prices are going to be reduced on chemicals. We must remember that not only the American market but the English market is open up to us on all products. Also we have inquiries from all over the world. This is not a temporary proposition, and the bottom is not going to fall out of things.

[Since the above was written an agreement has been made by the United States with Germany to exchange cotton for chemicals and dyestuffs. This will relieve matters as long as stocks in Germany hold out, but it will be a long time before manufacturing conditions in Germany are normal.—Ed.]

* President, J. H. Rhodes & Company, New York, N. Y.

THE STRIPPING OF METAL DEPOSITS*

AN EXPLANATION OF ONE OF THE TROUBLES OFTEN EXPERIENCED BY THE ELECTOPLATER.

BY GIRALDUS JONES.†

(Concluded from October.)

I must also draw attention when considering these effects not to overlook the fact that deposited metals are to a certain extent brittle and non-elastic. This property hastens their breakdown. If deposited metals possessed the same properties as ordinary rolled sheets they would offer greater resistance to the disruptive forces of unequal expansion and contraction.

It has been my experience to nickel-plate cast iron fire stands, and one set in particular was kept in a room which was never allowed to become damp. Yet in about six months' time the deposit was seen to be stripping. That I can only account for by the difference in the rates of expansion and contraction of the two metals. That is—solely by physical, as distinct from chemical, reasons.

Again matters are worse in this respect if coppering is resorted to, as the difference between copper and iron is nearly 50 per cent.

That these forces are of the first importance in their bearing upon the lasting qualities of deposits cannot be denied.

As I have already intimated, these views are merely the expression of my own opinions, but I am convinced that a field for investigation thus exists in the purely physical realm, and it would be valuable aid to the trade if those who enjoy the facilities for scientific research were to investigate the physical aspect thoroughly.

STRIPPING CAUSED BY DEPOSITION OF HYDROGEN.

A large quantity of stripped work is due directly to the absorption of hydrogen by the deposit.

The modern chemist looks upon hydrogen as merely the vapor of a highly volatile metal, because, when liquefied by the action of intense cold and great pressure, it assumes a steel blue color and is known to alloy itself with certain metals.

The element Palladium, when placed as the cathode in a solution of acidulated water and electrolized, increases in bulk owing to the absorption of hydrogen. Other metals, including nickel and tin, possess in a lesser degree the power of absorbing the gas.

It depends to a large extent upon the nature of the electrolyte. Members will recollect Mr. Spal's paper dealing with the action of dilute acids on tempered steels.

There exists little doubt that steel articles become very brittle after immersion in an acid solution for some time; or having been used as cathodes and evolved hydrogen in any solution. If the articles are gently warmed for a few days it is claimed that the original condition is restored and the detrimental effects of occluded hydrogen entirely eliminated.

Hydrogen is frequently deposited by electrolysis simultaneously with the deposited metal, and the practice of introducing, indiscriminately, such chemicals as ammonium chloride and other conducting salts in the solutions do but increase the facilities for the deposition of this gas. Conducting salts may be good servants, but exceedingly bad masters. Hence I would warn all platers to be conservative in regard to the use of them. Some organic acids, which in correct proportion have beneficial effects on the anodes, are detrimental in the extreme—if present in undue quantities—and cause the deposit to become most brittle, a condition which makes for greater liability to strip or break up.

I have observed in the case of nickel solutions that exhibited acid re-action, that the deposits were all that could be desired, when the articles were brass, but when steel articles were substituted under precisely the same conditions the result was anything but satisfactory, and a large percentage of the steel articles stripped—which undoubtedly was due to deposited hydrogen. It is known that brass and copper do not display this tendency.

Again, wrought iron articles under precisely the same conditions came out quite satisfactorily. This points to the presence of carbon, as being the direct agent in promoting the absorption of the gas, is a contention which is again substantiated by the following tests.

Soft iron goods, practically free from carbon, offered no difficulties to the production of sound deposits. Yet, when these same goods were, for mechanical reasons, case hardened on the heads, the trouble immediately presented itself, and it was found a most difficult matter to successfully nickel-plate the goods, a substantial modification of the method employed in the case of soft iron being demanded.

Now, as hardening is a process depending on the length of time to convert the surface to a certain depth into a form of steel by the carborizing action of the hardening agents, we can only conclude that this again proves that the presence of carbon promotes the occlusion of hydrogen.

Let us also consider the causes of stripping on cast iron (common). Carbon and silicon may be regarded as being essentials, since they are always present among other impurities in the pigs. Now pig irons vary considerably in composition and properties. The only points in common are the method of production and the invariable presence of carbon and silicon. Apart from these they might be considered as different metals, so much do they differ. Common iron contains from 2 to 4½ per cent. of carbon, existing partly in chemical combination with the iron, and partly as mechanically distributed, uncombined, or graphitic carbon; and on the relative proportion of the two forms of carbon depends the most striking difference between the varieties. In the greyest iron the carbon is almost wholly in the uncombined state, while in the hardest white iron it is almost entirely combined. Now, of the two varieties, the grey is the more difficult to deposit on. In fact, I have known of cases which have been looked upon as impossible to give really satisfactory results. The presence of uncombined carbon causes the deposit to be irregular, and liable to strip, and dirty in appearance. That of the combined variety is less so, if precautions against occlusion of gas are taken.

There are on the market special preparatory solutions which render the deposition possible with little more than ordinary attention. Now if the castings made from the white iron, in which the carbon is principally in the combined condition, are converted into malleable iron by burning out or oxidizing the carbon by means of heating the castings in oxide of iron, it will be found a matter of the utmost simplicity to electro-deposit on the same casting made malleable. This further demonstrates that where carbon is present in the combined form, there exists an affinity to absorb hydrogen, with the result that the plating is defective, unless special precautions to prevent the trouble are taken.

EFFECT OF TEMPERATURE.

Last, but not least, in importance, is the question of temperature of solution during deposition.

*A paper read at a recent meeting of the Institute of Electro-Platers, Birmingham, England.

†Representative of Langbein-Pfanhauser Works, Ltd., Germany.

Every plater must know from experience the troubles he encounters during spells of cold weather, that is, if he has not the necessary arrangements to compensate matters. Now, for reasons which I will presently explain, all electro-depositing operations should be conducted at not less than 60° F. This, in fact, should be a condition precedent in all plating plants.

The conducting properties of solutions—unlike solid conductors—decrease their resistance, or—conversely—increase their conductivities as the temperature advances, and correspondingly drop as the temperature falls.

The ratio is approximately 3 per cent. per degree F. That is to say, solutions falling in temperature from 60° F. to 40° F (or, as I have seen during winter months, as low as 35° F., just 3° above the freezing point, which amounts to a drop of 20°), would fall 60 per cent. in their conducting properties.

Unless the voltage or current densities are altered to meet the changed conditions, then the result is prolific stripping.

In the case of ammonium nickel sulphate solutions, a sudden drop in the temperature causes a precipitation of salt, rendering the solution short of its metal, but this does not happen with the modern solutions.

Pitting is also more prevalent in cold solutions.

Dissolution of the anode almost ceases; particularly is this the case in cyanide solutions.

In warm solutions, owing to the greater mobility and diffusive properties which obtain from temperate heat, the solution surrounding the cathode, as soon as it is deprived of the metal, is quickly replaced by richer solution, bearing their higher content of metal. This condition promotes efficiency and in turn prevents the possibility of stripping by absorption of gas.

DISCUSSION.

Mr. T. H. Lane, referring to the question of greasy goods, said he found it a good plan to pass work through boiling water, then through sawdust previous to hanging in potash solution. The plater when dealing with varied kinds of work, such as H. bars, typewriter parts that are delicate, etc., must exercise discretion when filling vats and should see that current density was properly adjusted. He thought heavy deposits of Cu previous to nickelling an advantage, but customers were not willing to pay for it.

Mr. J. Busby corroborated Mr. Lane on coppering. He thought a thin film of Cu was of no advantage, but a heavy deposit was to be recommended. With regard to greasy goods, he dealt with something like 10,000 rims weekly, and these were very greasy. He placed them in a stove for a short time, and then had them wiped over. The temperature of the plating room was very important, for when this was too low, loss of time and bad work resulted.

Mr. H. Jones said he had adopted the same plan as Mr. Lane, i. e., he sawdusted the work previous to potashing. He had had difficulty in replating, and would like to know of an efficient method of replating on old nickel deposits.

Mr. Frear thought the heavy deposit of Cu previous to nickelling, good. There was no advantage with the thin film of Cu. He had experienced difficulty with hardened steel goods, but had found the correct method of dealing with that class of goods.

Mr. G. Stenton said he had experienced no difficulty with grease. He used caustic potash with small addition of potassium cyanide.

Mr. J. L. Speak congratulated Mr. Jones for having dealt with the plater's worst troubles, but he did not think that the author's remarks on expansion were to be taken too seriously. In the case of defective plating that had not lifted in the operation of finishing constant changes of temperature would, no doubt, cause the deposit to lift. With a really good deposit stripping would not be a direct result of changes of temperature.

Mr. Ryder, in closing the discussion, said that the expansion theory was interesting. He had conducted some simple experiments with Zn, Cu and Ni, and these seemed to bear out Mr. Jones's remarks *re* expansion.

THE ASSAY GALLON

A SIMPLE METHOD EXPLAINING THE RELATION OF OUNCES TO GALLONS IN CHEMICAL WORK.

BY E. J. HALL.

There seems to be no uniform and simple system of calculating ounces per gallon in chemical analyses. For this reason and the large number of commercial solutions that are made up on the basis of ounces per gallon the following is offered.

A few illustrations from current practice will indicate the diversity and lack of extreme simplicity in this calculation.

From THE METAL INDUSTRY, February, 1913: If one ounce of solution gives 10 grains of silver, then as there are 142 ounces in a gallon, there will be $10 \times 142 = 1{,}420$ grains, which divided by 480 or 24 will give troy ounces or dwt. per gallon respectively.

From the PRINCIPLES OF ELECTROPLATING by Samuel Field: If 25 cc of solution on analysis gives 0.276 grams of silver, then one gallon will contain $\frac{0.276}{25} \times 4{,}540$ (cc in a gallon) or 50 grams. This number divided by 30.5 equals 1.64 ounces per gallon.

Or X mg of silver being obtained from 10 cc of solution we will have $\frac{X}{10} \times \frac{3785.33 \text{ cc per U. S. Standard gallon}}{31103.5 \text{ mg per troy ounce}} = \text{oz. per. gal.}$

The above calculations can be greatly simplified by determining factors for the numbers given. That for the last method is 0.1217, and the computation with this is

$$\frac{X}{10} \times 0.1217 \text{ or } X \times 0.01217 = \text{ounces per gallon.}$$

[1] The equivalents used in the calculations were furnished by the United States Bureau of Standards.

The basis of the proposed new system consists in selecting a unit of weight to represent the ounce and adopting as the standard volume an amount equal to the number of ounces in a gallon. This volume has the same value as the factor that would be derived from this relation and eliminates it from the calculation.

As we have two weight systems in use—the Troy for noble metals, and the Avoirdupois for other metals and substances, two units are necessarily required.

THE TROY GALLON.

As analytical work is conveniently conducted with metric units, one decigram (0.1 gm) was selected as a satisfactory unit to represent the ounce; and as there are 58416.6 grains of water in a United States gallon, it will contain $\frac{58416.6}{480} = 121.701$ Troy ounces of this liquid. Then using this ratio: If one decigram represents one ounce, 121.701 decigrams will represent one Troy assay gallon. And taking 1 gram of water as equal to 1 c.c., 121.701 decigrams equal 12.17 c.c.[1] Therefore it follows that if we take 12.17 c.c., or 12.2, which will usually be close enough, of a solution for assay, the number of decigrams of a substance found will equal Troy ounces per gallon directly, without calculation. And in volumetric work, if the standard solution is made of such a strength that 1 c.c. equals 1 decigram, the burette readings will be in Troy ounces per gallon.

THE AVOIRDUPOIS ASSAY GALLON.

The standard volume here is based on the same consideration as for the T. A. G. and differs only in an amount equal to the variance in the ounces of the two systems.

58416.6 gr. of water per gal.
437.5 gr. of water per av. oz. = 133.524 and gives for the av. assay gal.....13.35 c.c. ([2]) ([3]).

Discrepancies in some of the figures taken from publications are probably due to differences in the units employed and also errors in the values taken for these units. The U. S. Standard Gallon of 231 cu. in. is employed, and contains 5846.6 grains of water at 4° C. in vacuo. The figures expressed as c.c. are not absolutely correct and should be noted as milliliters. One liter equals 1.000027 cubic decimeters and not 1 cu. dec. The former expression, however, was employed as it is customary and the discrepancy negligible.

[2] Equivalents used in the calculations were furnished by the U. S. Bureau of Standards.

[3] Pipettes to deliver 1, 2 or 4 assay gallons may be obtained from Messrs. Eimer & Amend, New York, at 25c., 30c. and 40c., respectively, on specification.

METAL CLEANSING*

AN ARTICLE EXPLAINING IN A SIMPLE MANNER THE USE AND ACTION OF CHEMICALS FOR CLEANING METALS.

BY EDWIN C. SCOTT.†

The cleansing of metal articles in the course of manufacture has come to be of considerable importance, especially since the advent of high speed and automatic machinery and presses, and oil hardening operations on a large scale. The substances to be removed consist of silica (sand) on castings, oxides of the metals on new stock, castings and work that has been in stock, and oils, greases and fatty matters used in the lubrication of the work during cutting operations or for the protection of the stock from rusting.

In such cleansing operations the character of the metal to be treated and of the substances to be removed must be considered in determining the treatment to be given.

Cleansing agents used for this purpose may be divided into three classes: organic solvents, acids, and alkaline salts. A knowledge of the functions of the various cleansing agents is necessary in order to determine their suitability for the particular case in hand. In the case of the removal of oils, greases or fatty matters, we must go farther than this and consider the character of the oils, grease or fatty matters to be used as protective coatings or lubricants in the course of manufacture. The selection of the oil or grease for this use should not only be influenced by its efficiency and cost, but by the facility with which it can be removed later. If the cost of cleansing properly is increased to a greater extent than the saving in cost on a cheaper grade of oil, it would be folly to use such an oil. Such cases are of not uncommon occurrence.

The removal of silica and oxides of the metal, such as mill scale, forging scale and rust, are usually performed simultaneously, either in an acid pickling bath, by tumbling, or a combination of the two. The determination of the acid to be used should be made from the ease with which the oxides and silica are removed, and at the same time ensuring a minimum attack on the metal. HF1 is an excellent agent for the removal of the silica, and may be used in combination with an acid which will dissolve the oxides. An interesting article by Franklin A. Hobbs on this subject appears in the September issue of THE METAL INDUSTRY. The removal of oils and greases used as protective coatings, as lubricants, and in hardening, was formerly accomplished by the use of organic solvents. This method is rapidly being discontinued because of the high cost of the solvents combined with the difficulties and dangers incident to their use. As the solvent takes up the oils and greases, it soon becomes contaminated to such an extent that frequent renewals are required. With all the available solvents, except carbon tetrachloride, there is great danger of explosions and fires. These solvents are all volatile at ordinary temperatures, and the vapors produce unpleasant and sometimes serious effects on the operators. Gasoline has been most generally used. The vapors of gasoline produce nausea, dizziness and headache.

More efficient cleansing, without the difficulties mentioned, has been obtained by washing in alkaline solutions. The action of alkali in cleansing operations of this character depends upon its well known property of combining with fatty matters to form soap, and on its direct solvent action on some metals and metallic oxides. The resulting soap has a value of its own in emulsifying mineral oils as a lubricant and a wetting medium. Soap dissociates to a certain extent in water solution, and the alkali thus made available was formerly supposed to have a part in its action. This, however, does not coincide with the fact that, although oleic acid soap dissociates less than stearic acid soap in water solution, it has a good, if not a better, cleansing value. As a source of alkali soap would prove rather an expensive source, alkali bought as soap would cost approximately 60 cents per pound under the present market conditions. When the oils to be removed are all of a saponifiable nature, or where sufficient quantity is present to produce enough soap to emulsify the unsaponifiable oils present, the alkali alone will be all that is required. In cases where the oils are all unsaponifiable, or very largely so, soap should be used in connection with alkali. This soap may be cheaply obtained by adding some saponifiable oil to the alkaline solution. Red oil or crude oleic acid is easily obtained at reasonable prices, and produces as good a soap for the purpose as can be obtained.

The alkalies available as cleansers are the carbonates and hydrates of sodium (Na) and potassium (K), and mixtures of carbonates with hydrates. Where a milder action is desired, mixtures of carbonates and bicarbonates, or the so-called sesquicarbonate of soda (Na_2CO_3 $NaHCO_3.2H_2O$) can be obtained. As cleansers, the salts of sodium (Na) and potassium (K) have about equal values when considered in molecular proportions, from which it follows that 1 pound of caustic soda (NaOH) will do the work of about 1.4 pounds of caustic potash (KOH). This, together with the higher cost of potassium (K) salts, should eliminate them from consideration, provided of course that in practice equal results are obtained. This has, in my experience, always proven to be the case.

The particular form of alkali to be used will depend on the substances to be removed, the metal to be cleaned, and the subsequent treatment of the work. Except in

*A paper read before Connecticut Section of American Chemical Society, October, 1914.

†Chemist, Solvay Process Company, Syracuse, N. Y.

cases where enameling or plating is to be done, treatment in a hot soda kettle with sodium carbonate is sufficient. When preparing work for plating or enameling, a preliminary cleaning by this method is advisable.

In all operations for the removal of oil on work from automatic machines, or where any large amount of oil is present, it is advisable to separate as much oil as practicable mechanically, using a centrifugal apparatus. This effects considerable saving in cleaning materials, and the oil separated may be clarified and used again.

The soda kettle method as applied, is to agitate the particles to be cleaned in a boiling alkali bath, of a strength approximating ½ pound per gallon of sodium carbonate (Na_2CO_3), or its equivalent in other forms of alkali. Small articles are loaded into cylindrical baskets of wire cloth or perforated metal, and either rotated or plunged up and down in the bath. This should preferably be done mechanically, as a saving in labor is effected, and more uniform results obtained through the elimination of the personal factor. Except in the case of finished work, articles cleaned in the soda kettle should not be rinsed, as the alkali left on the work protects it from rust and obviates the necessity of drying. In the case of finished work, thorough rinsing and subsequent drying are necessary. The cleaning of very small articles, such as small screws, etc., is more efficiently carried out by revolving them in a barrel, similar to a plating barrel, in the hot solution. In operations on a large scale, the cleaning, rinsing and drying operations may all be carried out mechanically, the work being placed in baskets on a conveyor system which finally delivers it to the sorters or packers. One concern that I am familiar with, is very successfully handling about 75 tons per day of screws in such a system. In extreme cases, it may be advisable to use a caustic alkali in hot kettle work, but in most cases sodium carbonate will be preferable, as it is safer to handle and cheaper.

Another form of cleaning with alkaline materials, known as electric cleaning, is largely used where exacting conditions exist, as in preparing work for plating or enameling. For economical considerations, it is desirable to precede this operation with treatment in the soda kettle. This method consists of suspending the work in a hot alkaline electrolyte from one electrode and generally using the tank for the other electrode. There has been much discussion among operators as to whether the anode or cathode should be used for the work. In my experience better results have been obtained from the use of the anode for this purpose. As this is a case of removing electrode material, it appears reasonable. The efficiency of this operation evidently is due to the electrically accelerated chemical action combined with the mechanical action of the gases as liberated on the work. The most suitable forms of alkalies for this work are mixtures of caustic and carbonate. In general, mixtures of approximately 1 part of caustic to 2 parts of carbonate are most suitable. Solutions of ½ pound per gallon are sufficiently concentrated.

In the cleaning of aluminum and alloys containing considerable amounts of zinc, lead, tin, aluminum, or antimony, it is not advisable to use caustic, as these metals are strongly attacked by it.

In cleaning steel articles, it is sometimes advisable to use caustic alone, and where unsaponifiable oil has been used, the addition of soap at the rate of 1 or 2 ounces per gallon is advisable. Small articles cannot be successfully cleaned in baskets by this method, but may be handled in an ordinary plating barrel. This operation may also be adapted to handling large quantities by applying a conveyor system, which is continued to the plating operation also.

Before plating and enameling, it is essential that all oxides of the metals be removed. This is usually done in a bath of a suitable acid or in cyanide. Both are sometimes used. Great care must be exercised in these operations to prevent roughening the surface.

Recently it has been thought that the property of dissolving of oxides of iron and copper by concentrated solutions of caustic soda, might be applied to this class of work. This method has been investigated and such favorable results obtained that steps have been taken to protect it by patent. Considerable difficulty was experienced before proper conditions for the successful application of this reaction were determined, but the results have been very favorable. Light forging scale and mill scale have even been expeditiously removed, as well as rust and silica from castings, and tempering scale from springs. The removal of the oxides by this method does not impair the surface, and where used, previous to polishing operations, the amount of polishing required is greatly reduced over work cleaned with acid. There is also less tendency to rust on work cleaned in this manner. Many prepared cleaners for metal cleansing work are marketed under trade names. In case of those for oil and grease removal, analysis of a large number has shown them to be composed of mixtures of inorganic alkaline salts. In some cases soap is also used. Many contained more or less inert matter, such as clay, calcium carbonate, sodium sulphate, etc. Many were also sold at abnormally high prices. Acid substitutes are also sold, and are generally acid salts of the alkalies. Before deciding upon adopting any cleanser, it is well to obtain an analysis of it and compare its price with the cost of standard alkaline productions on the market.

Alkali is usually bought on a basis of its available percentage of the base potassium or sodium oxide (K_2O or Na_2O). Potash salts are purchasable, except in war times, as carbonate and hydrate. Soda salts may be obtained in greater variety of forms. Sodium carbonates is marketed as soda ash 58 per cent. sodium oxide (Na_2O), monohydrate 49 per cent. (Na_2O) and sal soda 21.6 per cent. (Na_2O). Caustic soda is to be had in varying strengths from 60 per cent. (Na_2O) to 77 per cent. (Na_2O), and in either the ground or solid state. In addition, there are standard mixtures of ground caustic and soda ash, known as causticized ashes, containing amounts of caustic soda varying from 10 per cent. to 45 per cent., and valued according to their content of total alkali.

There is another class of soda cleaners, known to the trade as neutral sodas, which are milder in action and especially suitable for laundry work or general cleansing by hand in factories, dairies, hotels, etc., and for general household use. These are mixtures of bicarbonate and carbonate of soda in approximately equal molecular proportions, with enough water of crystallization to prevent their caking up on standing. There is also another form where the bicarbonate and carbonate are combined chemically and crystallized with two molecules of water, known as sesquicarbonate, and having the formula of Na_2CO_3 $NaHCO_3$ $2H_2O$. It possesses the advantages of uniform composition and greater solubility than the mixtures.

In conclusion, I would say a word on the cleaning of floors, etc., in the factory. Much better results are obtained from the use of alkali alone as a cleaning agent on this work than where soap is used, except in cases where large amounts of unsaponifiable oil alone are to be removed. In cleaning around sanitary fixtures, the use of soda solution, to which has been added about ½ pint of a solution of sodium hypochloride, yields most excellent results and thoroughly disinfects at the same time.

THE ART OF METAL SPINNING

THE SPINNING OR FORMING OF METALS TOGETHER WITH THE TYPE OF TOOLS, CHUCKS AND LATHE REQUIRED TO PRODUCE THE ARTICLES FROM THE METAL BLANKS. THIS ARTICLE BEGAN IN MARCH, 1914.

BY EASY WAY.

(Continued from October.)

SECTIONAL OR SPLIT CHUCKS.

The metal must be compressed at this time that it may be drawn out on the sectional chuck for producing the concavity for the neck of the urn. The neck is formed on a No. 3 chuck by placing a lifter tool under the axis of revolution and working from the large diameter toward the smaller diameter, also pushing toward the axis and worked downward from each side toward the small diameter. Then the top edge of the metal is trimmed with the diamond point and the whole contour gone over with a planisher and knob tool to smooth all the straight conical and cylindrical surfaces, after which the tail center is withdrawn and the chuck with the urn on it is removed from the cone, the key piece loosened and the other chuck sections extracted.

There are also articles produced, such as urns and other ornamental receptacles, with a double curve or extra roll at their top. These shapes require a chuck that will receive the article within its housing and which is termed internal sectional chuck, because they are produced in halves or sections to admit and remove the article spun. All the metal that is not already shaped projects beyond

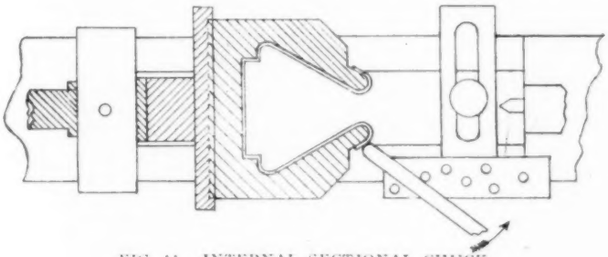


FIG. 11. INTERNAL SECTIONAL CHUCK.

the front of the chuck to be curled and conform to the shape required which is turned on the chuck and shown in Fig. 11. These chucks are made from hard wood or iron, and controlled on a stepped face plate. That is, to say the end of the chuck is finished flat and a diameter turned and fitted to a recess in the face plate as shown in the sketch and otherwise held by as many screws as there are sections in the chuck. In order that they may be assembled properly the plate and sections of the chuck are stamped with figures. With this class of work the curls and rolls are very often knurled to serve as an ornament which is attractive to the eye. The knurling wheels are commercial and of numerous patterns and of very pretty designs. They are forced against the metal and revolving on a hardened steel stud that is fastened in a forked holder made of steel. The raised rim or any circular projection of the spun article can be ornamented true to the pattern sunk or raised on the periphery of the knurl wheel. Now that the internal chuck is bored and finished the article to be curled is placed in it, mounted and fastened on the face plate and the tool rest set in position after which the usual methods of spinning are employed. Care must be taken to insure a perfect job because as the metal is curled it is necessarily stretched considerably, and if not kept soft and pliable will break open, and the article will be ruined.

To obtain the double curve of a curled object the tools generally used are the round nose and planishers. After the metal is forced onto the shape of the chuck it is then smoothed, trimmed and then knurled. The knurl that is commonly used by so many even at this late day. There are many who do not know how to start them properly to obtain a perfect pattern of the periphery, and after their endeavor to produce it have nothing more than the nibbling away of the metal and straggling indentations, but when it is started properly and rotates with the article as if they were a pinion and gear, a true pattern of the knurl is obtained by the compression. When it is taken into consideration that the reproduction of a knurl is of forcible contact by pressure and must sink into the work without slipping or skipping to produce the ornament, the correct starting of it is relied on to forestall ruining an article that has been completely finished except for this operation. If, when starting to knurl an object, the pressure is at first applied moderately and the lathe

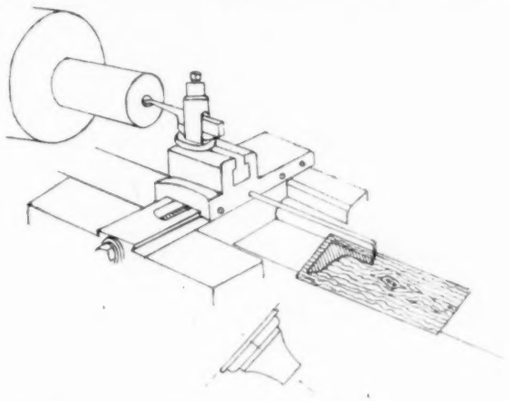


FIG. 12. PROTECTING AN INTERNAL CHUCK WITH AN INDICATOR AND TEMPLET.

spindle rocked back and forth with the left hand, and at the same time continuing to force the knurl into the metal with the right hand until the pattern is indented sufficiently to prevent slipping. The lathe may then be started by power and a perfect-rolling contact obtained. This method has proven its value on many fancy articles by manual dexterity when producing transformation from a plain surface to one that is ornamental.

To bore an internal chuck true to the shape it is intended for is apparently a difficult operation, but as there is a correct system and way for all things, so there is for this undertaking, which is herewith illustrated (see Fig. 12) and explained as follows:

After the block has been stationed on the face plate, and a straight hole bored to the required depth and the small diameter of the urn's neck produced, an outline of one side of the urn is reproduced on a piece of sheet metal. This is then fastened to a strip of wood which is in turn fastened to the shears of the lathe; its center aligning with the lathe centers. Then remove one of the gib binding screws in the slide rest and thread a suitable rod of steel that it may fit in place of the gib screw. Grind the other end of the rod to a sharp point and then bend to an angle of 90 degrees. Screw this into the threaded hole tight, but do not allow it to bind the gib. The pointed end of the rod should hang directly over the line and about 1/16 of

an inch away from the metal on the strip of wood. By setting the boring tool in the tool post so that its first cutting edge is just touching the wood block at the beginning of the hole that is bored and equal to the diameter of the urn's neck and the rod pointing to a corresponding place on the sheet metal, the shape can be reproduced inside the block without any confusion, other than keeping the pointed steel indicator over the line on the sheet metal. This is governed by the cross screw handle of the slide and the movement of the lathe carriages back and forth. Any shape may be reproduced in this manner, be they what they may, with perfect exactness. These mould and chuck shapes can be produced in this manner as well in oval as in circular work, which is often accomplished on ornamental designs. The same spinning and turning rules apply, the only difference being that the tools maintain a central position.

There are lathes constructed with a movable oval back center so the oval articles may be produced the same as circular ones. Some spinners, however, prefer a sliding chuck which can be adjusted and set for any desired oval, and constitutes a simple but ingenious rig that may be removed from the lathe head as any other common jaw chuck. There is still another style of sectional chuck used for curled and double curve work when that part requires no other operation than trimming. This style of chuck is carried on a cone attached to the face plate, the same as the ones previously described, and has preliminary chucks also as the case demands. This style of chuck is concaved toward the lathe head, whereas the other styles were convexed. The article to be made as shown in Fig. 13, requires a cylindrical shape, so it becomes necessary to produce a spun cup, its diameter equal to the largest diameter of the finished article and the length sufficient to produce the curl on the finishing or sectional chuck. The end of the cylinder is flat as it leaves the preliminary chuck, but will be concaved as shown in Fig. 13 on the sectional chuck. Therefore considerable of the metal requires compressing near the axis for this purpose to insure a contact surface with the chuck first. The tool is as usual, worked outward and always thins the metal which must be overcome at this time, therefore, a risk must be ventured and the metal thickened at the base,

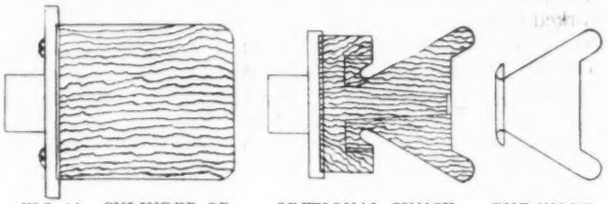


FIG. 13. CYLINDER OR CUP CHUCK. SECTIONAL CHUCK. THE WORK.

and at the same time prevent buckling. Hence, the inward travel of the tool requires sufficient force to compress the metal and the outer travel to maintain its proper shape in relation to the chuck.

(To be continued.)

MULTIPLE CORE BOXES OR DRYERS, WHICH?

By W. H. Parry.*

There seems to be some confusion in the foundry and patternmaking trades as to the proper term to use in designating just what a multiple core box is. While it is plain that the term implies a core box in which more than one core is made at a time, yet many members of the sister trades are wont to confuse this kind of a core box with the dryers that are used to place the cores in after being formed in the multiple gang or group core boxes.

A few months ago an applicant for employment as a metal patternmaker stated that he was particularly strong on making multiple core boxes. When called upon to explain what he meant by the word multiple, he gave as his idea of that much abused term, a fair description of the good old-fashioned dryer, which, to my positive knowledge, has been in use for over thirty years. Of course, it is nothing against any device that it has been in use for ten times thirty years, but when a man tries to tell you that it is the latest thing out in core-making and misnames the animal at that, it is about time to declare a moratorium; while we commune together in our feeble efforts to straighten out matters, so that the rising generation will not commit the sins of their forefathers.

Webster defines the word multiple as "a number exactly divisable by another" and it is a very good definition, but it is not used in that sense in the mechanical lines; the meaning of it being to convey a number of similar parts. Thus it follows that when we say multiple core box we mean a core box that, instead of being made so that but one core can be made at a time, three, four, five and six can be made therefrom. Perhaps a better term to use would be multiplex which means manifold, but somebody in the musty past whose vocabulary was twisted, hung the word multiple on the gang or group core box and it seems likely to stick for all time.

The use of dryers in the making of cores has at last been recognized as one of the best and surest methods of preventing the distortion of cores while being baked. By their use cores can also be made without wires, not always, but in many cases and once adopted in manufacturing foundries there is not one chance on earth that the old way of either picking the cores out of the core boxes or rolling them out on a plate will get a foothold again. Perhaps some of The Metal Industry readers do not know what a "dryer" is so we will attempt to describe one.

A dryer is really one-half (and sometimes less) of a core box and it is placed in position over the cores after one-half of the core box is removed. The whole is then turned over and the remaining half of the core box removed leaving the cores resting in the dryer. The dryer then acts as a carrier or container and is placed in the core oven where the cores are baked in their correct relative position.

Some dryers are made of aluminum because of its lightness, but most of them are made of gray iron and are mere shells varying in thickness from a sixteenth-inch to a quarter-inch. The inside is made to conform to the core shape and the outside can be most any old shape, though it is well to bear in mind that the more even the thickness of the dryers, the straighter the resultant castings. A little kink in the making of the patterns for the dryers will not be amiss here, that is, to chamfer off the edges that would naturally come in contact with the green cores first, leaving enough of the shape of the core box to properly support the cores. By doing this it facilitates matters greatly and makes due allowance for the shaky hand of any core maker who has had a tussel with old John Barleycorn.

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THE NICKEL PLATING OF STOVE CASTINGS

AN ELECTRO-PLATING PROBLEM WHICH APPARENTLY ADMITS OF MORE THAN ONE SOLUTION.

One of the readers of THE METAL INDUSTRY, who is engaged in the plating and finishing of stove plate castings, found that he was having some difficulty in obtaining a proper finish on his work. He therefore stated his case to the Inquiry Department of THE METAL INDUSTRY and the answers obtained from experts are so interesting that it has been deemed advisable to publish them in the form of this short article. The inquiry in language of the troubled plater is as follows:

THE PLATER'S TROUBLE.

I am having considerable trouble in nickel plating stove castings, although I feel confident that the solutions are all right, as they are new ones that were made up about two weeks ago, and contain the following materials:

Double salts	¾ pound
Single salts	2 ounces
Boric acid	1 ounce
Water	1 gallon

These castings are pickled before polishing, as follows: They are put in a hydrofluoric acid bath for one hour; the bath is made up of 225 gallons of water and 3 gallons of hydrofluoric acid. We add 6 quarts of acid per 2,000 pounds of castings.

The tank is cleaned every four weeks and the castings, when coming from the acid bath, are rinsed in cold running water, boiled in water for ten minutes, then dipped in a boiling sal soda solution containing 4 pounds per 50 gallons of water. I use a Kalye solution, and each piece is swabbed therein, after which they are scrubbed with pumice stone and then stuck in a hot copper solution and then in the nickel solution.

We copper plate the castings to try and prevent them from peeling but without results. The castings peel when two of them come sharply in contact and under the buff wheel. In peeling the nickel adheres to the copper, but the copper does not adhere to the iron, although the copper does not blister.

ANSWERS BY EXPERTS.—NUMBER ONE.

The peeling is due to three causes. First—The nickel solution is too acid, one ounce of boric acid to 10 gallons of solution would have been sufficient when making up a new solution. Remedy—Neutralize with either strong spirits of ammonia or carbonate of ammonia. The amount of ammonia to use depends upon how much free acid there is in the solution. I believe in this case it would be safe to use about 1 ounce of carbonate of ammonia to each gallon of solution. Take out about 10 gallons of solution and dissolve the carbonate in water of ordinary temperature and add slowly the solution with constant stirring. When about half of the ammonia water has been added try to plate, if the plate still peels, add the balance of the ammonia water.

Second—The acid in the pickled castings has not been entirely removed; thus increasing the acid in the nickel solution. It is an impossibility to nickel plate pickled castings in an acid solution. To nickel plate pickled castings an alkaline or neutral solution should be used, but never an acid one. Remedy—The pickled castings should be thoroughly rinsed in cold water; then hot water and boiled for not less than ten minutes in lye or sal soda. Boiling in hot water will not neutralize the acid, but only dilutes it, the lye will. The castings should then be hung in the nickel tank, but, of course, they should be scoured first.

Third—The peeling is probably also due to the coppering. There is too much cyanide in the copper. A copper solution to be used for coppering previous to nickeling should not contain any free cyanide. Although coppering before nickel plating is a thing of the past and it is not at all necessary. It has been proven to be an injury instead of a benefit because nickel is a hard and brittle metal while copper is soft. Nickel contracts during electrolysis and pulls or causes the copper to shrink, that is why, when the nickel plate strips, it takes the copper with it.

Briefly I should suggest that you do the following:

First—Test the nickel solution with litmus paper; if too acid, add enough ammonia to neutralize or make it slightly alkaline and try to plate with non-pickled castings and without coppering. If the plate does not peel the solution is all right and the causes are elsewhere.

If the casting must be pickled, be sure to remove all the acid from the castings by boiling in lye or soda, the longer the better. This will cause the castings to tarnish and it should be removed by dipping in a solution of 1 gallon of hydrochloric acid to 5 gallons of water and then rinsed in cold water for a second and hung in the nickel tank. Use about 4 volts for a few minutes, then reduce to 2½ and plate for about an hour. If you must copper plate before nickel plating, be sure to copper plate the castings heavy enough so it will stand buffing without cutting through and also plate with a low voltage.—Joseph Walters, Southern Stove Works, Richmond, Va.

NUMBER TWO.

The principal cause of your difficulty with peeling of your nickel plated stove castings may be due to acidity and lack of conductivity. The proportions of material you have used is also excessive and the peeling may be caused by too dense a solution, as 8 ounces of double salts and 2 ounces of single salts with 2 ounces of sodium or ammonium chloride would have given excellent results without any trouble.

I would suggest that you try twenty gallons or more solution in a separate receptacle, reduce the solution one-third with water and then add 2 ounces of common salt per gallon of solution. This, I believe, will remedy the difficulty as the trouble is evidently in the nickel solution and not in the cleaning. If the solution works satisfactorily from the above suggestion, hang over-night several good sized pieces of sheet steel, perfectly clean, upon the work pole in your solution. The action of the slight excess of acid will act upon the steel and form hydrogen in the solution which will rise to the top of the solution and escape. It is the hydrogen which deposits with the nickel that causes the peeling or non-adherence of the deposit. Remove the excess of hydrogen and the trouble will be overcome. The common salt and the sheet steel with a reduction of the density of the solution with water will overcome the trouble by liberating the excess hydrogen.—Charles H. Proctor.

NUMBER THREE.

Regarding the peeling of nickel plated stove castings, I make the following suggestions:

First—Reduce the density of the solution with boiling water until they stand at 6½ or 7 degs. Baumé. It will be necessary to take some of the solution out of the tanks and placed in barrels and used as required instead of boiling more salts for new solutions.

Second—Add ¾ of a pound of potash to every gallon of water in the cleaning tank. Caustic soda may be used and if it is a pound per gallon, should be added to the cleaning solution. Keep the solution at the boiling point.

Third—After the work has been in the cleaning solution long enough to loosen the dirt, it should be dipped in a solution made up of 8 or 10 parts of water and 1 part of sulphuric acid, rinsed, and then scrubbed with pumice. Again thoroughly rinsed in clean running water and placed directly in the nickel solution.

Unless the copper solution contains an excess of cyanide it will not aid in the cleaning operation and even with an excess of cyanide, a strong current should be used, or it will be of little benefit. I advise discontinuing the use of the copper and suggest the use of an electric cleaner in place of it. An electric cleaner will also do away with scrubbing with pumice stone.

Instead of the pickle used, I would recommend the following: Five parts of sulphuric acid, 10 to 12 parts of water and about 1 part of hydrofluoric acid. Put sal soda in the hot water and allow castings to remain in it for two or three minutes, then take them out and allow them to dry.

I believe the trouble is due to faulty cleaning and by following the above advice it will be overcome. I also suggest that he use lard oil or tallow for oiling in the polishing room and not use any mineral oil.—J. H. Hansjosten, Globe Stove and Range Company, Kokomo, Ind.

GENERATED VERSUS PURCHASED POWER

AN ARGUMENT IN FAVOR OF THE ISOLATED PLANT.

BY GUION THOMPSON.*

A factory department was being planned for the manufacture of a special metal product and the power required therefor was found to be about 400 h. p. It then became necessary to determine the most economical method of obtaining it. The power company sold energy by a "sliding scale" rate and billed it on the monthly consumption, the rate falling as the consumption increased, and in this case they agreed to include electricity for light in the power bill instead of billing it at a higher rate, as is usual. The probable consumption of the plant was estimated to be about 75,000 kilowatt-hours per month, which equaled a cost rate of $0.01764 per kwh if purchased. The heating of the buildings required the installation of boiler equipment costing $2,000, and an annual coal bill of about $1,000 and an attendant, who would also care for the operation of the machinery, at $900 per year. The interest and depreciation on the boiler at 10 per cent. equals $200 plus $1,000 for coal and $900 for attendant equals $2,100 per year, or $175 per month, which, added to the power company's monthly bill for power and light, would make the cost per kilowatt-hour equal $0.01997 for power, light and heat.

The cost of installing generating equipment was estimated to be $30,000, the exhaust steam to be used for heating. The coal consumption was estimated to cost $4,900 per year and water consumption $2,200. The interest and depreciation on $30,000 at 10 per cent. equals $3,000 per year plus coal at $4,900 and water at $2,200 and attendance at $1,650 (which is one man at $900 and a fireman at $750) equals $11,750 per year of 900,000 kilowatt-hours or, $0.01305 per kwh for power, light and heat. Therefore:

Cost of purchased power per kwh	$.01997
Cost of generated power per kwh	.01305
Saving effected per kwh	$.00692

which is 900,000 kwh times .00692 equals $6,228 saved per year, which, in less than five years, would pay for installing the plant.

As the above annual saving equals 10 per cent on $62,280, there is ample leeway on the cost of plant to allow of additional expenses for ornamentation or special refinements in its construction.

Attention is called to the fact that if the usual higher rate lighting service charged by power companies had to be considered in this case, the saving would have been greater. The costs per kilowatt-hour above given refers, in both cases, to the power at the distributing switchboard and do not take into account the transmission losses within the factory, which would be the same in each case and are a matter for separate consideration.

Besides the actual computable savings in generating one's own power, there are various other advantages to be gained in so doing. You are independent of the transmission troubles to which the power company is subjected. Thunder storms do not affect your power, you can control the voltage and consequently the transmission losses within the plant, while, with outside power the voltage is affected by the outside load and you have to suffer, your transmission losses increasing with decrease of the service voltage and maintenance costs increasing with increase of voltage, especially that of incandescent lamps. With decrease of voltage the capacity of the motors decrease and, if they are running fully loaded, such a voltage drop causes them to operate overload conditions and they will heat and depreciate accordingly.

Connected to a public service power company's lines you are subject to the disturbance caused by others taking power from their lines while with your own plant you are limited to the disturbance for which you alone are responsible. If your voltage is low it can be immediately corrected, while with purchased power, any complaint in regard to voltage regulation must be continued for weeks and sometimes months before it is effective, because of the difficulty and expense to the power company of rectifying the trouble without receiving complaints from other customers.

The liability to shut down because of trouble with the generating apparatus is practically eliminated with modern equipment. With old apparatus in the early days of electric power application in factories and commercial buildings the power companies used, as an argument in favor of their service, the greater reliability and continuity of power supplied by them as against that generated in isolated plants.

Another point in favor of the isolated plant is that, with such a plant it becomes possible to keep a better grade of mechanic in the factory than is justified without it. That is to say, that the man who has charge of the plant operation is better able to care for the rest of the machinery in the factory than the man usually employed where there is no power plant. With such better grade of attendance a great deal of outside electrician's and piper's labor, etc., may be saved and better judgment and oversight provided in the installation of motors, shafting and machines than if left to an outsider.

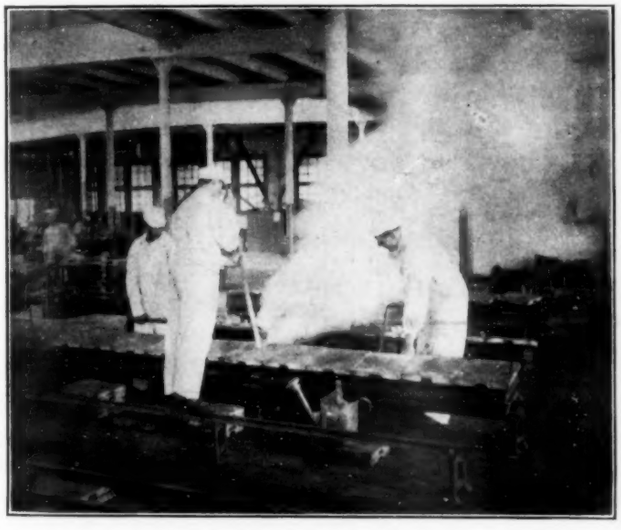
*A. J. Patten Company, engineers and surveyors, Waterbury, Conn.

SANITATION AND SAFETY FIRST APPLIED TO THE BRASS INDUSTRY*

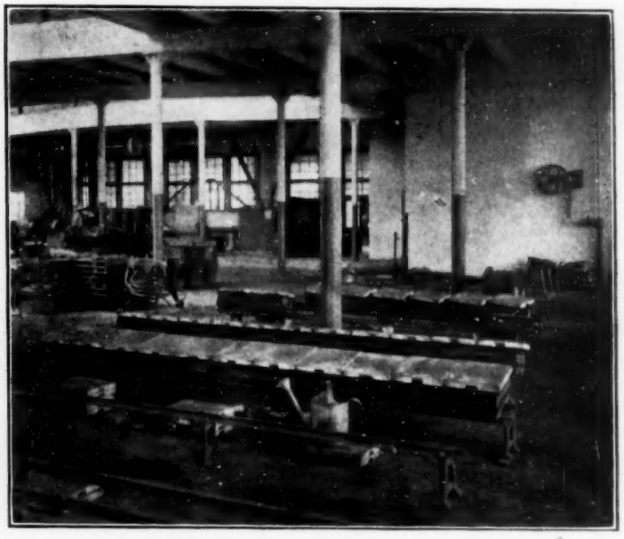
A Detailed Description of the Methods Employed for the Workers' Benefit at the Plant of the Pullman Company, Pullman, Ill.

By F. Moerl.†

Few topics have commanded the attention of those engaged in the manufacture of brass products for the last two or three years, more than that of sanitation and safety first, and it is only fitting that this subject should receive due consideration. These days nearly every issue of our various trade journals contain articles treating on the subject, enlightening us as to what has been and what can be done in improving present conditions. The laws written on the statute books of the different States, as well as the compliance therewith and the voluntary application of safety devices and adoption of sanitary measures on the part of the shop managements, are for the purpose of improving the welfare and conditions of working men.



POURING OFF. NOTE THE MEN ARE DRESSED IN WHITE. THIS IS UNUSUAL IN A BRASS FOUNDRY.



THE SAME ROOM THIRTY SECONDS LATER. NOTE THE ABSENCE OF SMOKE.

And while it may appear that great sums of money are spent these days in this safety work with no direct cash returns, in carefully scrutinizing results, we will find it not alone one of humanity, but also one of economy. For instance, a man working on a certain machine is injured and incapacitated for a week or two, which may require the machine to stand idle, or as is usually the case, the injured man is replaced temporarily by one not so familiar with that particular job. Consequently the output will not come up to the usual quality or quantity, which means a financial loss to the firm. How much better a man can work in a clean, well-lighted and well-ventilated foundry or finishing shop, than in one presenting opposite conditions, is well known.

At the Buffalo convention of the American Institute of Metals, in 1912, Dr. Charles L. Parsons, representing the United States Government Bureau of Mines, brought up the subject of health conditions in brass foundries, and the discussion which followed demonstrated that many of those present were keenly interested in this problem of conserving human energy, and that several of the industries represented had already installed shower baths and other sanitary equipment.

July 1, 1911, the occupational disease act became effective in the State of Illinois, and at first the attitude of many of both employers and employees, was more or less hostile throughout the State. Some employers, considering it a new-fangled fad, reluctantly complied with provisions of the law and then only to such extent as to be within its absolute requirements. Others willingly and cheerfully installed the necessary equipment, and even went beyond that which was expected of them in providing safety and sanitary measures.

On the other hand, the men did not unanimously welcome the law as one made primarily for their welfare, and displayed more or less antagonism. They regarded the compulsory compliance on their part as an encroachment upon their personal liberties. At the Pullman Company's plant in Pullman, these conditions have been practically overcome, and what is now commonly known as the "Safety First" movement is being more and more advanced by both management and employees.

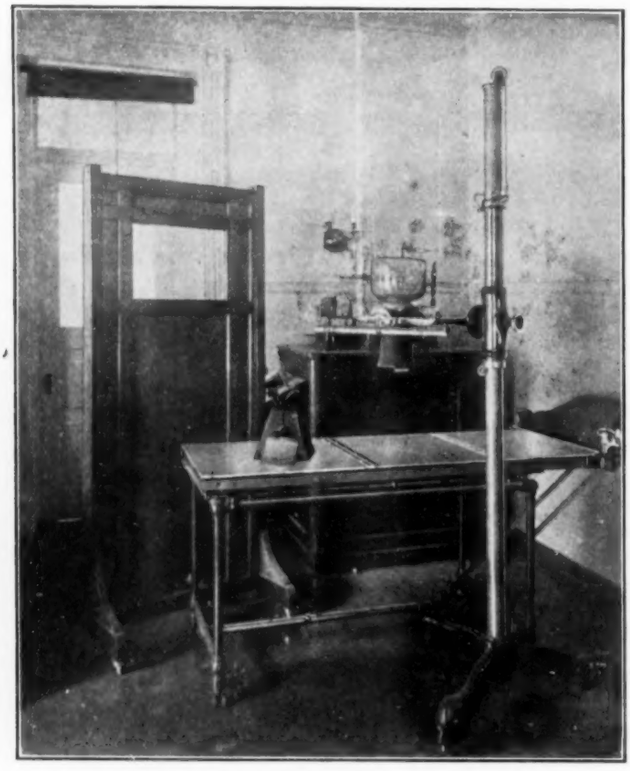
In patent medicine advertisements we sometimes see an illustration of a person before and after using the highly recommended "cure-all-and-heal-over," and in recalling the sights while witnessing the earlier medical examinations, and again those following a month or two later, we were vividly reminded of these ads. This refers to general personal appearance and cleanliness, particularly the teeth. The bad condition of the latter was astounding, and nearly every other examination resulted in the doctor's order, "Clean your teeth." As my duties require the supervision of the manufacture of trimmings for approximately 2,000 cars a year, taking in not only Pullman, but also various contract cars for the different railroads throughout the country, my observations of the Safety work are practically limited to the brass department, and outside of that, I can speak only in a general way.

*Presented at American Foundrymen's Convention, Chicago, Ill., September 7-11, 1914.

†Superintendent foundries, The Pullman Company, Pullman, Ill.

That portion of the work directly affected by the Illinois occupational disease act, is in charge of the safety department chief clerk, and it is his duty to supervise and regulate the medical examinations, baths, changing of overalls, jumpers, towels, etc., making proper entries on forms gotten up for that purpose. Molders, grinders, coremakers, melters, in fact, all brass foundry employees, including the office force, polishers, buffers, platers, painters, glaziers and sand blasters, come under the supervision of this end of the department. The safety engineer investigates and recommends relative to the compliance with Federal, State and city laws and ordinances regarding matters of sanitation, building and prevention of accidents. This end of the safety department takes in the entire plant.

Before we can put a man to work at any of the named

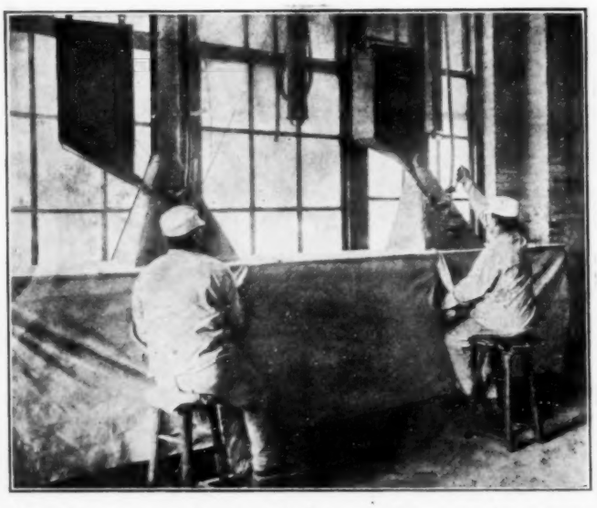


THE X-RAY ROOM AT THE PULLMAN PLANT, PULLMAN, ILL.

occupations, he must first undergo a medical examination, made by the company's physician, who reports on a regular form as to the applicant's health. When the application has been approved, the man may be put to work, but before commencing, the safety department furnishes him with a pair of white overalls and jumper, towels, nail brush, and, if necessary, goggles, respirator, rubber gloves or rubber apron. The goggles are supplied to grinders; rubber gloves and respirators to sand blasters. A proper record is kept of this transaction, and when leaving the company's service these articles must be returned to the safety department, where they are properly sterilized. Suitable shower baths are installed, and it becomes obligatory on the man's part to take a shower bath at least once each week, a certain time being allotted each department or part thereof for that purpose.

One-half hour is allowed by the management for each man every week, and no deduction of time is made while taking the bath. Once, and in some cases, twice every week, he turns in his soiled overalls and jumper, and is furnished a freshly laundered set. The towels are also frequently changed the same way, and the respirators cleaned and sterilized at regular intervals.

Each employee coming under the regulation of the safety department is allotted a two-compartment steel locker, equipped with a small mirror, proper shelving and suitable coat and hat hooks. Locks are fitted to individual keys; the keys are fastened to a key ring, together with the employees' gate house brass check. The lockers are divided into an upper and lower compartment; the upper for the street clothes, and the lower for the shop wearing apparel, and are so located in the different washrooms as to allow sufficient room for changing from street to shop clothes, or vice versa. The washrooms are equipped with long, and in some cases, individual wash-basins. The large ones have a number of faucets with running water, the latter being properly mixed to a suitable temperature in an adjacent large tank. Liquid soap containers are placed at regular intervals. Ten minutes prior to quitting time, these washrooms are opened to the men to wash in and change clothes, and by



THE WORKMEN ARE WELL PROTECTED WHEN SAND BLASTING AT THE PULLMAN COMPANY.

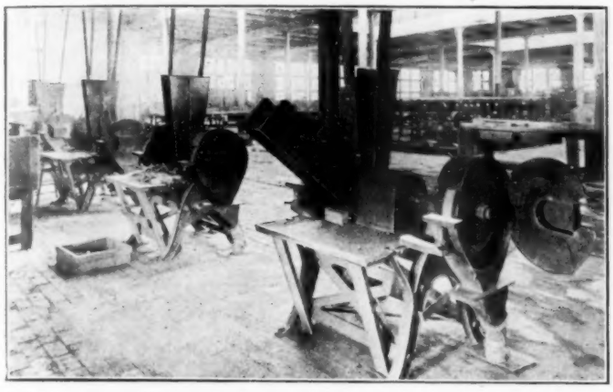
the time the whistle blows, they are all cleaned up, and in leaving the works many might well be taken as belonging to the office force.

Every employee in the brass foundry and finishing departments must undergo a medical examination once every month, and if found affected with plumbism, or any disease peculiar to the trade at which he is working, he is most closely scrutinized with a view of overcoming the cause of the ailment, which usually results in the correction of some slight improper practice, and the consequent disappearance of symptoms. In the more severe cases and those where no correction can be made, other employment is found, but even then the case is kept under the doctor's surveillance until complete recovery.

One of the great problems in the brass foundry and brass finishing shop, is that of ventilation. While the construction of some of the older buildings is such as to necessitate artificial means of removing fumes and foul air, yet buildings of more modern types are, or should be, so designed as to insure natural ventilation by providing sufficient windows and skylights, which can be easily and quickly opened and closed. In summer time this will work out without any great difficulties, but in cold weather we find that the men object more or less to the opening of the windows, and some would rather inhale the metal fumes. In such cases we found that the factory

inspector insisted upon opening up everything during pouring time. In the accompanying illustrations will be found reproductions of two photographs. One picture was taken while pouring, and the other was snapped in the same position as soon as the smoke had cleared away, which was only thirty seconds.

The floors in the brass foundry should be kept moist at all times, and one of the laborers delegated to liberally use the sprinkling can. Under no circumstances should any one be allowed to eat lunch in the foundry,



GUARDS ON BELTS AND EMERY WHEELS AT THE PULLMAN WORKS.

polishing or plating rooms, and suitable places should be provided for that purpose. The Pullman car works was one of the first shops to meet all and even went beyond the requirements of the occupational disease act, and the management at all times is willing to consider any new safe-guarding device, or suggestions of health measures.

GETTING AN INJURY DRESSED AT THE FIRST AID TO THE INJURED CABINET, PULLMAN WORKS.

In order to better demonstrate some of the results of our activities along these lines, we present a few reflected pictures, all of which were taken at our works.

The emery wheel exhaust heads and guards were designed and made in our own plant. The exhaust heads are made of ⅛-inch sheet iron, and the guard bands of ¼-inch boiler plate, assembled by oxy-acetylene welding. The whole head is arranged to slide, so as to take up for the wear of the wheel. The lower portion of guard front can be adjusted so as to close off that part of wheel not in use. The lid for removing the wheel is hinged, and when closed is fastened by a catch, as well as a bolt and nut, serving as stress members in case the wheel bursts.

Our shower baths are equipped with a mixing tank, which is supplied with hot and cold water, regulating it to a suitable temperature. They are grouped in sets of seven, each again sub-divided by canvas curtains, for the individual bath. Vapors are drawn out by large natural draft ventilators, placed in ceiling or side wall.

We have 28 "First Aid" cabinets placed around the different departments of the works, and about seventy men are trained to do first aid work. The first surgical attention is received in the "first aid" room, and in case of fracture the X-ray apparatus is used for determining the mode of procedure. Photographs are taken of all fractures. While we term it the "first aid" room, the equipment and facilities are sufficient for handling any minor or more serious operations.

To clear a dipping room from the obnoxious acid fumes is a difficult task. After trying out various schemes and ventilating systems, we found an 18-inch wall type fan run at 1,700 revolutions per minute direct connected to a motor, the most effective. The motor must be either encased or the fan shaft extended into the next room and there connected.

Guards completely enclose the tumbling barrels and also the belts up to a man's height. The belt guard is arranged to open easily and quickly in case of belt repairs. The portion of guard over the tumbling barrel proper can be opened similar to the roll top of a desk.

PLATINUM MINING DIFFICULTIES.

Although the high price of platinum encouraged prospecting in the United States during 1913, the expected increase in the production of crude metal was not realized. The total production from California and Oregon, according to the United States Geological Survey, amounted to 482.87 crude ounces and was valued at $18,477. Of this, 460.37 crude ounces came from California and were rated at 80 per cent. fine—that is, it contained 368.3 fine ounces of platinum. That from Oregon—22.5 ounces—was not so carefully cleaned and was reckoned at 70 per cent. fine, or 15.75 fine ounces of platinum. The greater part of the California platinum came, as usual, from the large gold-dredging operations in Butte, Yuba, Sacramento, and Calaveras counties. The production of refined platinum in the United States from domestic sources in 1913 was 1,034 troy ounces, valued at $46,530.

The question of a larger yield of domestic platinum depends principally upon working the Oregon and California beaches, including the old beaches now several miles inland and elevated considerably above sea level. Several machines involving somewhat fanciful or novel ideas were installed during 1913. As a rule, these machines were handicapped because they consisted either of competent concentrating apparatus without adequate means for digging the crude sand and delivering it to the concentrator, or, in other places, the reverse has been the case, and the machine, well suited for large-scale excavation at a low cost, has not been equipped with a proper system for concentrating these heavy sands after excavating them.

The platinum industry remains practically stationary with reference to the world's supply and the price.

EDITORIAL

OLD SERIES. Vol. 20. No. 11. NEW YORK, NOVEMBER, 1914. NEW SERIES. Vol. 12. No. 11.

THE METAL INDUSTRY

With Which are Incorporated
THE ALUMINUM WORLD, COPPER AND BRASS,
THE BRASS FOUNDER AND FINISHER
AND ELECTRO-PLATERS' REVIEW.

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TRADE CONDITIONS

The interesting report of Mr. E. E. Murphey upon his trip abroad in search of heavy chemicals which we publish in this issue of THE METAL INDUSTRY is not very encouraging in tone as to the duration of the European war and its effect on trade, and we could easily become very pessimistic by dwelling very long upon the various statements made by Mr. Murphey. This report teaches us one thing, and that is that the United States should lose no time in preparing to manufacture those materials that have hitherto been imported from abroad, and which are so important to our industrial progress. Heavy chemicals, such as alkalis, cyanides, acids and dye stuffs can all be made in this country now to good advantage. If we have not the natural resources here whereby we can obtain the raw materials necessary for the manufacture of chemicals then a process of adaptation should be put in force. By this we mean that one chemical which we are able to make and which is similar in properties to the one required, may be substituted as, for instance, caustic soda, now made here, may be used in large extent in place of caustic potash previously imported. Sodium cyanide may be and is used in place of potassium cyanide, infusorial earth may be used in place of Vienna lime, and so on down the line.

This question is largely up to the consumer, if he can adapt himself to the new conditions and invent ways to use what he can get and not sit down in despair because of the lack of a certain material then there need be no let up in the general conduct of every day business. On the contrary, mineral deposits may be developed, factories built and operated and capital may be invested at a profitable rate of interest while chemical and research laboratories may work overtime devising new processes. In this connection, to show more clearly what we have in mind, we will cite the condition now existing in regard to metal cleaners and those used in connection with electric cleaners. Before the war the bulk of material used in the preparation of these cleaners came from abroad. A great deal of alkali material is produced here and the sale of cleaners has increased to a surprising extent. This is probably partly due to the fact of the cessation of importations of cyanide salts that formerly were used for cleaners and whose place has now been taken by these alkali products that are obtainable in the United States.

Although as reported in another column of this issue of THE METAL INDUSTRY, the United States Government through the Department of State has made an agreement with Germany to exchange chemicals for cotton; the situation will be relieved only so far as stocks of chemicals on hand hold out. As Mr. Murphy says

very few factories are being operated for lack of coal, help and shipping facilities. Supposing the coal and shipping questions are settled, how about the help which is being killed by the thousands every day? It certainly will be a long time before factories and mills are running smoothly again in Germany and Belgium.

An analogous situation exists in regard to the metal spelter. Before the war it was not considered good business in this country to make zinc dust or blue powder in the zinc smelting process. Blue powder used in the Sherardizing process, dye works and mining processes was imported from Germany and Belgium with the exception of about 500 tons made here. The price before the war was 6c. per pound and it was not profitable to manufacture it in the United States. Cheap labor conditions abroad coupled with the use of "prolongers" in the zinc retorts made it possible for the Belgian smelter to furnish the bulk of "blue powder" used. At the present writing the price is 15 cents per pound, and it is now worth more than the metal zinc itself! The result is that one large zinc smelter has already started to make zinc dust and is making an effort to get some of the business that has been drawing 2,500 tons of zinc dust from abroad. So from the above it will be seen that there is ample opportunity for American manufacturers and consumers to adapt themselves to the existing conditions and continue to keep the wheels turning.

SAFETY FIRST

The paper on SANITATION AND SAFETY FIRST APPLIED TO THE BRASS FOUNDRY, by Fred Moerl, of the Pullman Company, Pullman, Ill., which is published in this issue of THE METAL INDUSTRY, is well worth careful consideration. The comparison between methods employed in this country for the preservation of life and the wholesale murder and butchery now going on abroad is startling to say the least. By advocating and adopting such methods and safety first appliances that Mr. Moerl describes, the United States or any country tends to greatly strengthen its manufacturing facilities. We can not but believe that when the tide of business rises again to its proper level that the concerns who are most solicitous of the welfare and safety of their employees will be the first to reap the benefits derived from increased business.

Mr. Moerl's paper comes at a particularly opportune time because of the popular agitation now going on in the country for the cause of conservation of life and health. A great many people in this world have to be "thought for," that is they are incapable mentally of looking out for their own health and safety. There are, too, a great many among us who become so enthusiastic and engrossed in our work that we have not time nor inclination to look out for danger signs. It is for such as these, to say nothing of lessening legal liability, that the devices and methods that Mr. Moerl tells about have been designed and put into action. We hope to have more papers than this one and that such description of Safety First methods will serve to induce others to adopt them until every shop or factory will be as safe or more so than the average worker's home.

NEW BOOKS

ROBERTS-AUSTEN—A RECORD OF HIS WORK—Size 6¾ x 9 inches. 382 pages including index. Numerous illustrations. Bound in half Morocco leather. Published by J. B. Lippincott Company. Price $6.00. For sale by THE METAL INDUSTRY.

This work is a Selection of the Addresses and Metallurgical Papers, Together With an Account of the Researches of Sir William Chandler Roberts-Austen, K. C. B., D.C.L., D.Sc., A.R.S.M., F.R.S.

"The actual results of Roberts-Austen's scientific work were sufficiently important to ensure immediate recognition and embodiment in all subsequent works on physical metallurgy. . . . To students not less than to others, these Addresses should be of value by reason of their clear and arresting statements of fundamental principles—principles with which each generation of students must become familiar."

Hitherto the only readily accessible memorial of Roberts-Austen's work has been his own "Introduction to the Study of Metallurgy." All other recorded results have remained scattered through the proceedings, transactions and journals of various learned societies. In that there is an ever-widening circle of men who have been trained on the lines which he did much to define, it was felt that it would be most advisable to collect the papers and addresses of the great metallurgist in a single volume in order to give to those who are today students and practical workers in the field an opportunity more fully to appreciate the nature and scope of his activities and the inspiring influence of his personality. The contents of the book are arranged in the following order.

Outline of Roberts-Austen's career. His Work at the Royal Mint. The Alloys Research Committee. Iron and Steel. Royal Society Papers. Royal Institution Lectures. Art Metal Work. General Bibliography.

HENDRICKS' COMMERCIAL REGISTER OF THE UNITED STATES.—Size, 8½ x 10¼ inches. 1,596 pages, including index. Bound in cloth. Published by S. E. Hendricks Company, Inc. Price $10. For sale by THE METAL INDUSTRY.

The twenty-third annual edition of Hendricks' Commercial Register of the United States for Buyers and Sellers has just been issued. It is by far the most complete edition of this useful work that has been published. Many new features have been added; thousands of trade names and titles of identification have been inserted and numerous duplications expunged.

"The Assistant Buyer," formerly published by the Sullivan System, has been incorporated with it, and the entire work has been thoroughly revised and improved in every detail.

This publication lists manufacturers of everything made from brass, bronze, copper, aluminum, platinum, zinc, lead, iron, steel, etc., whether cast, rolled, drawn, pressed or forged, including bar, plate, sheet, wire, structural and other shapes; pipe, tubes, bands, hoops, high carbon, tool and other high-grade steels, bolts, nails, nuts, rivets, screws, rods, spikes, chains, etc. Castings of every description from all metals and manufacturers of every kind of machine, tool, etc., used in fashioning and forming the raw material into the finished product.

The book numbers some 1,600 pages and contains about 350,000 names and addresses, with upwards of 45,000 Business Classifications; 138 pages are required to index its contents.

Shop Problems

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE OF THE METAL INDUSTRY. ADDRESS THE METAL INDUSTRY.

ALLOYING

Q.—Could you inform me what is the eutectic of copper and aluminum? Also what the composition of the alloy is and at what temperature it melts.

A.—Alloys of copper and aluminum that contain over 5 per cent. of copper form a eutectic alloy, the copper being present as a definite compound, CuAl. This is brittle and hard. The equilibrium diagram for the alloys of copper and aluminum may be found in the eighth report to the Alloys Research Committee of the Institute of Mechanical Engineers, 1906, Carpenter and Edwards.—J. L. J. Problem 2,052.

BLUEING

Q.—Please give me a formula for a solution used in coloring gun barrels, watch hands, etc. Would like to know how the gun barrels are made blue. Also I would like to know how the Russian steel finish is made.

A.—Gun barrels, watch and clock hands are usually colored blue in a muffle or retort heated to 600 degs. Fahrenheit. The surface of the articles must be cleaned and free from rust before heating.

A chemical solution for the purpose consists of the following:

Water	1 gallon
Hyposulphite of soda	8 ounces
Acetate of lead	2 to 4 ounces

The solution is used nearly boiling for coloring small articles. Immerse in the solution until a uniform blue color is obtained. The articles should afterwards be lacquered or immersed in hot linseed oil to protect the color.

Gun barrels should be cleansed and heated to 180 degs. and then the solution should be applied with a sponge until they are of an even blue. Afterwards wash in boiling water and dry thoroughly and rub over with boiled linseed oil.

Russian blue steel is produced by a method of pickling and cold rolling when the metal is being reduced to the proper diameter. It is impossible to produce this finish by any method of heating or chemical coloring.—C. H. P. Problem 2,053.

CASTING

Q.—We are having considerable trouble getting a good color on our yellow brass castings, and also getting them to run sharp. We are using a commercial yellow brass ingot, and we pour the metal as soon as it is ready and watch the temperature as closely as possible, but in spite of all we have been able to do our castings are rough and "curly" on the outside. We have tried a small amount of aluminum, but find that this interferes with dipping, as the acid does not seem to touch the aluminum. We make large quantities of red brass castings without trouble, but do not seem to be able to handle the yellow.

A.—When yellow brass castings run curly, skin drying the molds is very useful. You should have an analysis made of your yellow brass ingot and if you find it high in iron or very low in tin you will have an explanation of your curly castings and their lack of good color.—J. L. J. Problem 2,054.

CLEANING

Q.—Please let us know what you consider the best method to clean dirty galvanized goods.

A.—Cleanse the galvanized articles from dirt or grease by immersing in a warm solution consisting of 1 gallon of water and 8 ounces of sodium carbonate. Then wash in cold water and immerse in a warm solution of sal ammoniac and water, using 4 to 8 ounces to each gallon of water. Immerse for a few minutes until the solution dissolves a small portion of the zinc and leaves a bright surface, then wash and dry by heat.

If the surface is badly corroded instead of the sal ammoniac use 4 to 8 ounces (fluid measure) of muriatic acid in the same quantity of water and use warm. A very short immersion in the acid will be sufficient to remove the oxide upon the articles.—C. H. P. Problem 2,055.

DEPOSITING

Q.—Would you kindly tell me if it is considered practicable to deposit silver on a nickel plated surface highly colored?

A.—Very little trouble should be experienced in depositing silver upon a highly colored nickel plated surface provided the following instructions are followed:

First—After polishing the nickel surface cleanse the surface very carefully. It may be necessary to use a thin fluid paste of precipitated carbonate of lime mixed with water and applied with a soft oval paint brush in addition to the regular cleansing operation.

Second—After cleansing as above and washing in water immerse in a warm cyanide solution, using from six to eight ounces of cyanide in each gallon of water at a temperature of 120 degs.

Third—From the above solution immerse directly in a silver strike solution. This solution should consist of the following proportions:

Water	1	gallon
Chloride of silver	½	ounce
Cyanide of potassium	8	ounces

Arrange the strike solution in a small tank or barrel, which should have been previously coated with coal tar asphaltum in the regular manner of lining tanks.

Use three poles, two for the anodes and one for the work pole. The anodes should consist of two pieces of soft sheet silver; dimensions in proportion to the articles to be plated. A good strong current should be used at 2 to 3 volts pressure. The articles should be immersed in this strike from 10 to 15 seconds and should then be placed directly in the regular bath until sufficiently plated. Care should be used that a strong enough current is used in the strike solution. If the strike silver deposit shows purplish or pinkish tones the deposit will invariably peel in polishing. This will denote that the current is not strong enough or the solution does not contain sufficient cyanide.—C. H. P. Problem 2,056.

DIPPING

Q.—Kindly give me a formula for a cold dip for black to be put direct on brass. Also a cold dip for a blue on brass.

A.—The following solutions may be used cold, but more satisfactory colors are produced if the solutions are used slightly warm:

Black Dip.

Water ammonia, 26 per cent	1 gallon
Carbonate of copper	1 pound
Carbonate of soda	8 ounces
Water	1 quart

Mix thoroughly and immerse the cleansed articles, which should be previously acid dipped in a mixture of equal parts of aqua fortis (38 per cent.) and sulphuric acid (66 per cent.). If the articles do not become black at once then add more carbonate of copper or until a satisfactory color is produced.

Blue Dip.

Hyposulphite of soda	8 ounces
Acetate of lead	2 to 4 ounces
Water	1 gallon

Another blue dip consists of the following:

Water	1 gallon
Hyposulphite of soda	8 ounces
Nitrate of iron	2 to 4 ounces

The articles should be cleansed and acid dipped as previously stated. To preserve the colors it is advisable to lacquer the articles after coloring.—C. H. P. Problem 2,057

Q.—I would like to know what causes a white sediment to form in a bright dip. I am using two of vitriol to one of nitric.

A.—The white sediment that you note in your acid bright dip is sulphate of zinc. This results from the action of the acids upon your brass. The use of an excess of sulphuric acid precipitates it as a sulphate. The only way you can overcome an excess is to reduce the amount of vitriol and increase the nitric. Equal parts should give you a good dip. Otherwise syphon off your clear acid each morning, after settling over night, into a reserve dip pot. This will consume a few minutes in changing over.—C. H. P. Problem 2,058.

FINISHING

Q.—Can you give us a reliable formula for Japanese bronze, also operations necessary to obtain the finish?

A.—To produce a satisfactory Japanese bronze finish the following methods should be pursued:

If of brass cut down in the regular manner to a good smooth surface (a high color is not necessary), then cleanse in the usual manner and copper plate for five or ten minutes. If a cyanide of copper bath is used run slowly so that the deposit will be a nice soft pink color (acid copper baths as a rule produce the best surface for this finish). Now prepare a cold solution of sulphuret of potassium, using from ¼ to ½ ounce to each gallon of cold water and add a small amount of sal ammoniac or sulphate of ammonia (not more than 1 ounce to five gallons of the dip).

Now immerse the copper plated articles in the dip, moving them to and fro until a dark brown variegated surface is produced; then remove quickly, wash in water and dry out thoroughly. Now brush the surface with a brass wire scratch brush, the crimped wire kind give the best results, and these should be worn down considerably and be perfectly clean. Go over their surface lightly and you will obtain an excellent finish.

If you require a deeper chocolate brown then use a toning solution. This solution is prepared by using a pint of the stronger dip added to a gallon of cold water. After brushing as above mentioned give a momentary dip in this weak solution. This will give you a deeper tone. Wash and dry and lacquer. Do not rescratch brush unless the color is uneven.—C. H. P. Problem 2,059.

MIXING

Q.—Can you tell us whether the amount of lead and tin in brass has any effect on the metal as far as scars and spillyness are concerned; for example, when there is:

a. From 1 to 2 per cent. of tin only,

b. From 1 to 2 per cent. of lead only,

c. From 1 to 2 per cent. of lead and tin together in the metal.

A.—The percentage of tin and lead as given above should have no effect upon the physical characteristics of the brass, or soundness of the bar. Scars and spills are due entirely to mechanical manipulations.—K. Problem 2,060.

Q. Please furnish typical manganese and phosphor bronze mixtures with special precautions necessary in manufacture. Could manganese replace a casting of 80 per cent. copper and 20 per cent. tin as far as wear and hardness are concerned?

A.—Manganese bronze and phosphor bronze are best obtained in the ingot form from reliable smelters. While manganese bronze has the hardness of mold steel it is not an antifriction metal and should never be used as such.—J. L. J. Problem 2,061.

Q. We are having considerable difficulty in casting panels for elevator. We are using red metal mixture of 8 pounds copper, 1 pound zinc, 2 ounces lead. The thickness of metal is 3/16 and we find these castings break on the sides. We have poured them from the ends also from both sides with the same results.

A.—The addition of 2 ounces of tin to your mixture will greatly strengthen it. The mold should not be rammed too firmly and immediately after each casting is poured the sand should be dug away from around the gates, so that both gates and casting may contract freely.—J. L. J. Problem 2,062.

PLATING

Q.—Kindly advise me how to make a platinum solution for use on brass articles.

A.—We would suggest the following formula for a platinum finish on brass articles:

Chloride of platinum	1 ounce
Phosphoric acid syrupy	3 ounces
Phosphate of soda	2 ounces
Borax	½ ounce
Water	1 quart

Use platinum or carbon anodes and three volts pressure.—S. Problem 2,063.

Q.—Kindly advise what is the cause of the flaws on the sample knife blade. I am putting in four dozen blades to a batch and some will come out like sample while the remainder will be perfect. These blades are plated and cut down (burnished) before I receive them after being mounted to the handles, and I replate them to cover bolster. My belief is that the flaws in the blades are done in the first operation.

A.—The difficulty you experience does not appear to us to be due to flaws in the knife blade but to small particles of silver, probably a peroxide of silver, floating in the bath which become cemented in as if they were in the deposit and produce the rough streaks as noted upon the silver plated blade.

These particles may come from one or more anodes that become dark or blackish under the influence of the current and do not dissolve in the solution readily. Too high a voltage and a slight excess of free cyanide may also cause the trouble as the bath becomes warmer due to the increased temperature of the atmosphere. In the winter time this trouble probably would not occur, as at that time the solution is considerably lower in temperature.

We would suggest that a little more silver be added to the solution, preferably cyanide of silver to decrease the amount of free cyanide developed due to the increase of temperature. It might also be advisable to place the anodes in muslin bags to prevent any particles of undissolved metal from floating in the solution.

When the small black specks are removed from the plated blade with a sharp penknife no flaws appear to exist, so it must be due to one or the other causes mentioned, rather than the flaws as you infer.—C. H. P. Problem 2,064.

SILVERING

Q. Will you kindly explain how to throw silver on glass for re-silvering mirrors?

A.—We should refer you to the article entitled, "The Silvering of Mirrors, by Emanuel Blassett, Jr., which appeared in THE METAL INDUSTRY for December, 1913. Problem 2,065.

STRIKING

Q.—I am having trouble with my "quicking" solution. It only covers the brass in patches. I use at present ½ ounce of red oxide mercury and 1½ pounds of cyanide to the gallon. Are these proportions right?

A.—Your solution is weak in mercury. The usual proportions are as follows:

Water	1 gallon
Red oxide of mercury	½ ounce
Cyanide, 98-99 per cent	8 ounces

Your solution is too strong in cyanide and weak in mercury. Add at least ½ ounce more mercury per gallon. If the results are not much better then reduce the strength of the solution one-half by adding water. If the coating of mercury at any time comes up dark by immersing the articles, after washing, in a solution of cyanide and water only the mercury becomes bright. Use 8 ounces of cyanide to each gallon of water for the purpose.—C. H. P. Problem 2,066.

PATENTS

REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

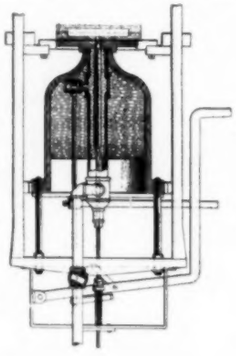
1,111,641. September 22, 1914. **Method of Manufacturing Tubular Metal Castings.** Hugo Brosch, Vienna, Austria-Hungary.

The present invention relates to the manufacture of metal-castings, and particularly of metal tubes and tubular metal-castings, and has for its object to enable the use of rigid or metal cores, which may be used many times. The improved process consists in coating a metal core, as shown in the cut, before the casting, with a lubricant or grease which will not melt at the working temperatures employed, and which enables the core to slide within the solid metal-casting so that after the casting his sufficiently solidified to retain its form the so prepared metal core may be straightway withdrawn from the casting.

A further object of the invention is the preparation of materials for coating a mold core, for the purpose described.

1,110,659. September 15, 1914. **Casting Apparatus.** William C. Urban, of Granite City, Ill., assignor of one-half to Hoyt Metal Company, of St. Louis, Mo., a corporation.

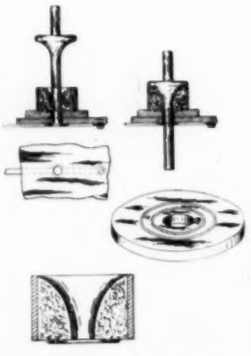
This invention relates to an apparatus, as shown in the cut, for making die castings and has for its object the production of a very efficient means for handling molten material whereby the dross which accumulates at the surface of the material in the melting pot is prevented from entering the die or mold. Also, to provide an apparatus for melting metal and forcing the molten metal into a die by air pressure, without liability of injuring the operator.



Another object is to provide means for so confining the molten metal that it will not cool to any appreciable extent in flowing from the melting pot to the die or mold.

1,112,465. October 6, 1914. **Apparatus for Forming Pouring-Gates for Molds.** William Mills, Birmingham, England.

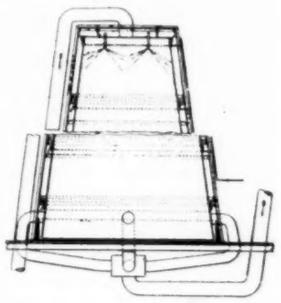
The present invention relates to apparatus, as shown in cut, for forming the pouring gates for molds, more particularly to the pouring gates employed in the molding or casting of the lighter metals, where said gates have to be placed above the opening or cavity in the mold in order to allow the molten metal to obtain a certain degree of gravitation so that it may flow freely to every part of the mold. The invention may, however, be also employed when forming gates to be used in casting or molding the heavier metals. The pouring gates employed for the above named purpose consist, as is well known, of a circular or the like box containing sand, which sand is so pressed and formed in said box as to leave a funnel or the like shaped aperture or cavity in same.



The box is then placed in position on the mold with the smaller end of the funnel or like shaped aperture directly over an opening or cavity in the mold.

1,112,546. October 6, 1914. **Chamber Used in the Manufacture of Sulphuric Acid.** Willie George Mills and Charles Turner Packard, of Ipswich, England, assignors to Edward Packard & Company, Limited, of Ipswich, England.

The object of this invention is to provide improved chambers for use in the manufacture of sulphuric acid.



According to the invention the inventors form a lead chamber of the shape of a frustum of a pyramid, and preferably of a cone which is the limiting case of a pyramid, so that the walls slope outward from top to bottom, and cause water to flow down the outer surface of the walls so as to keep the chamber cool.

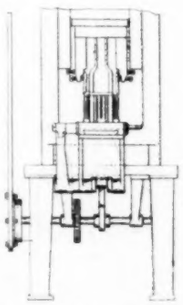
What the patent covers is:

In apparatus, as shown in cut, for the manufacture of sulphuric acid the combination of a chamber of the shape of a frustum of a pyramid, a framework, a water supply pipe surrounding the top of the outer surface of the wall of the chamber, a trough surrounding the wall of the chamber and connected to both the wall and the framework and a water supply pipe surrounding the outer surface of the wall of the chamber just beneath the trough.

1,112,695. October 6, 1914. **Multiple Tube-Forming Mechanism.** Otto J. Groehn, of Detroit, Mich., assignor to Briscoe Manufacturing Company, of Detroit, Mich., a corporation of Michigan.

The invention relates to sheet metal forming machines of that type in which a tubular blank is refashioned to form a multiple unit tube.

The invention relates more specifically to the means employed for feeding the blank to the dies and for withdrawing the core member or mandrel from the formed blank, and the invention consists in the construction as shown in cut.

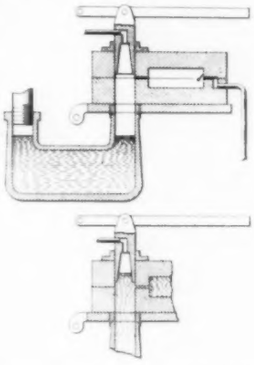


Generally described, the forming machine comprises a core member having a series of fingers or individual cores around which the individual tubes are formed, together with a series of laterally reciprocating die members which successively form the sheet metal about the individual cores. Machines of this type have heretofore been made in which a single multiple unit core member is reciprocated into and out from operative relation with the laterally moving dies, the blank tube being placed upon said core member in advance of its inward movement and being stripped therefrom on its return movement. Such constructions are, however, objectionable; first, for the reason that the engagement of the blank with the core member is a somewhat dangerous operation for the workman; and further, because it is difficult to feed the blanks to the machine as fast as it can perform its operations. To avoid these objections as well as to otherwise improve the machine, the inventor has devised a construction of core holder and feeder, in which a plurality of multiple unit cores are suc-

cessively adjusted into operative relation with the dies and are alternately adjusted to a position where the blank may easily be engaged therewith.

1,112,694. October 6, 1914. **Art of Making Castings.** C. M. Gray, East Orange, N. J.

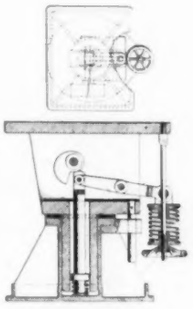
This invention is a method of making castings, particularly die castings, and the objects of the invention, broadly stated, are twofold; first, to minimize the quantity of air or gases in the die for the purpose of producing castings substantially free from blow holes, or entrained air or gases, and, second, to produce castings which are substantially free from oxidized metal.



With the specified objects in view, the invention, as shown in cut, consists in precluding the admission into the die, in whole or in part, of the air or gases which may be confined in the passages or chambers intermediate the metal reservoir and the die, just prior to introducing the metal into the die, and, also, precluding the introduction into the die of any oxidized metal which may be contained on the surface of the metal as it flows from the metal reservoir to the die.

1,113,224. October 13, 1914. **Molding Machine.** Wilfred Lewis, of Philadelphia, Pa., assignor to the Tabor Manufacturing Company, of Philadelphia, Pa., a corporation of Pennsylvania.

The present invention relates to molding machines of the kind known as jarrers or jar molding machines in which a mold support carrying the flask, pattern or patterns, and sand or other mold forming material, is first lifted above and then allowed to drop back into collision with an anvil, the shock of collision being relied upon to compact the sand or other mold forming material about the patterns.



The object of the present invention is to provide simple and effective means, as shown in cut, for obtaining blows of varying intensity in the operation of a jar molding machine of the kind in which the molding table is lifted a definite and invariable distance above the anvil preparatory to each collision, and for obtaining a desirable reduction in the power required to operate the machine as the intensity of the blows struck decreases.

1,114,055. October 20, 1914. **Metal Alloy.** Edward Smith, London England.

This invention relates to a white metal alloy of high luster, capable of taking a brilliant polish and closely resembling silver in appearance. It is particularly useful for making articles which are to be silver plated and may even be used instead of silver, as it closely resembles this metal and is little affected by atmospheric conditions.

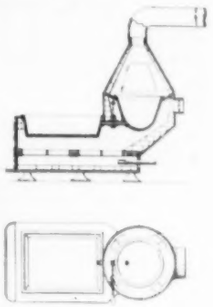
Referring to the mixture the inventor says:

According to my invention the metal alloy is formed by mixing or alloying copper, nickel, zinc, tin and lead in the required proportions and in the manner hereafter described. The proportions in which I prefer to mix the metals are:

Copper, 70.17%	40	lbs.
Nickel, 14.91%	8½	lbs.
Zinc, 8.77%	5	lbs.
Tin, 4.38%	2½	lbs.
Lead, 1.75%	1	lb.
Total	57	lbs.

1,112,993. October 6, 1914. **Furnace for Use in the Art of Electrotyping.** G. E. Dunton, New York, N. Y.

This invention relates to an improvement in furnaces particularly for use in the art of electrotyping, but which may be used equally as well in the stereotype, linotype or other similar trade industries.

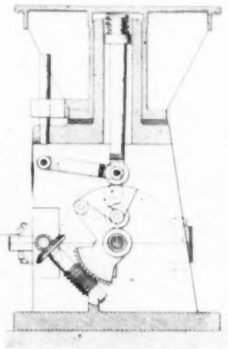


The invention has for its object to provide means whereby the usual melting pot, used in the electrotyping art, is supplied, as shown in cut, with molten metal in such a manner that the molten metal can be maintained at the same level at all times.

The invention further has for its object to provide a furnace with a plurality of melting pots or receptacles adapted to contain molten metal, the molten metal of one of the melting pots or receptacles adapted to be transferred to the other melting pot or recepacle for the purpose of replenishing it when the molten metal therein falls below the desired level.

1,113,794. October 13, 1914. **Molding Machine.** Wilfred Lewis and John T. Ramsden, of Philadelphia, Pa., assignors to the Tabor Manufacturing Company, of Philadelphia, Pa., a corporation of Pennsylvania.

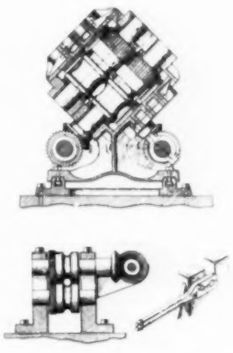
The invention relates to jar molding machines of the kind in which the mold support is alternately lifted above and then allowed to fall back into collision with the anvil of the machine to thereby compact the sand or other mold forming material about the pattern or patterns mounted on the mold support.



The object of the invention is to provide simple and effective mechanical provisions, as shown in cut, for lifting the mold support above the anvil and for varying the distance through which the mold support is thus elevated to thereby vary the intensity of the blow struck on collision and also to facilitate starting the machine into operation. Variations in intensity of the blows struck are desrable in forming molds of different kinds, and in some cases, in different stages of a single mold forming operation.

1,113,383. October 13, 1914. **Tube Rolling Machine.** G. J. Thust, Detroit, Mich.

This invention relates to a tube rolling machine designed for the speedy and economical manufacture of seamless tubing from tubular blanks or billets. The invention aims to simplify and economize the manufacture of seamless tubes of this character by supplanting the tedious and expensive method heretofore employed, with a simple operation involving only the single passage of a billet through a series of drawing rolls, as shown in cut, thereby producing by one operation a completed tube without reheating, pickling or cold drawing.



One object of the invention is to effect a saving of material in each tube produced, by eliminating the necessity of providing the tube with a tag end, which tag end serves no useful purpose on a completed tube and has heretofore been cut off and discarded as waste.

EQUIPMENT

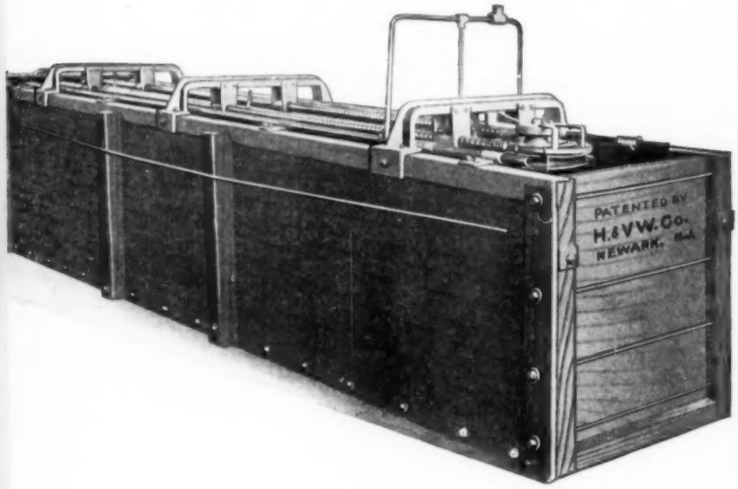
NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

MECHANICAL PLATING MACHINE

The Hanson & Van Winkle Company, manufacturers of electroplaters' supplies, Newark, N. J., are now manufacturing, under letters patent No. 1,108,145, granted August 25, 1914, the mechanical electroplating machine shown in the illustration.

This apparatus, it will be seen by noting the illustration, consists of an automatic screw conveyor, which may be mounted on any tank suitable for electroplating purposes. The device shows a marked improvement over ordinary automatic screw conveyors and is designed to handle an immense quantity of work in a plating bath. The operation of the machine is very simple. The work to be plated is racked and the racks are hung on the conveyor rod which carries them through the solution and they are returned to the starting point, the time of travel being fixed to suit conditions.

A very ingenious mechanical device is employed to fulfill the conditions of travel, the work being carried along one side and brought back on the other side. It will be noted in the picture that there is a flat disc mounted at one end of the tank. This flat



THE HANSON & VAN WINKLE AUTOMATIC PLATING MACHINE.

disc contains metal fingers which are movable up and down, their movement being governed by springs. When the rack, holding the work, comes to the end of the worm screw, a finger slips down behind the wire hook forming the handle of the rack and the flat disc, being turned by the motive power of the conveyor, the finger, of course, pushes the rack around the semicircle of copper rod until the rack is pushed off to the worm screw on the other side of the tank and is carried to the end of its journey. By this method the plating is continuous, the racks of work coming through at fixed intervals throughout the day, and an enormous amount of work can be handled with small loss of time.

In one installation 115,000 valves are plated in a day of nine hours and a greater amount of smaller articles can be handled or a correspondingly smaller amount of larger pieces. The capacity of the apparatus can be arranged to suit the individual piece which is to be plated. Tanks are made of various sizes to accommodate the conveying apparatus having a line of travel of from 20 to 50 feet, according to the quantity and size of the work which is to be plated daily.

The constant movement of the work through the solution permits a higher voltage to be used than in the still tank, thus employing a greater ampere current and effecting a shortening of the time of deposit.

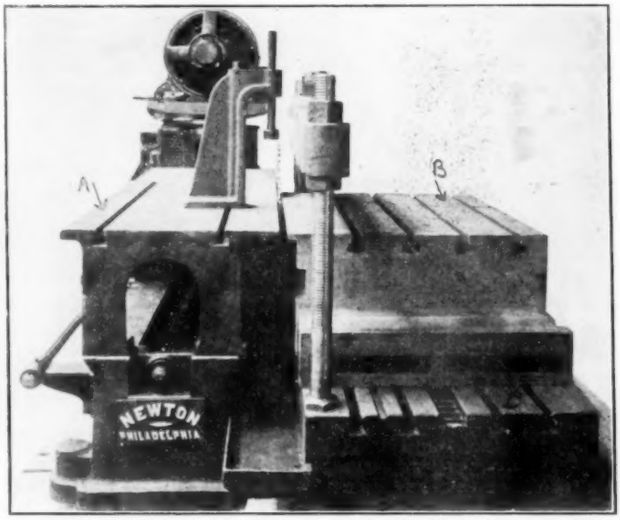
The utility of the apparatus is best shown in the handling of moderate-sized work—builders' and plumbers' hardware and fixtures, novelties, automobile valves and parts, oil cans, hollow ware, machine parts, telephone and typewriter parts and similar work.

This conveyor is now on exhibition at the western branch, 110 North Clinton street, Chicago, Ill., and at the Newark factory, 269-271 Oliver street, Newark, N. J., of the Hanson & Van Winkle Company.

COLD METAL SAWING MACHINE

The photograph shows a cold metal sawing machine designed and manufactured by the Newton Machine Tool Works, Philadelphia, Pa., for the purpose of cold sawing of metal castings.

This machine is known as their combination type as, in addition to the sawing features, the tables marked on the cut A and B and the V block C may be removed and the saw plate replaced by a cutter head to permit the surfacing of any castings that may require finish.



COLD METAL SAWING MACHINE.

The main or bottom table D has hand in and out adjustment to control the depth of cut when facing and the location of the cut when sawing.

This particular machine carries a saw blade 32 inches in diameter, has capacity for sawing through gates or risers up to 9½ inches in diameter in one cut, and flat sections 9½ inches high above the top table and 30 inches in length. On brass and copper a feed or saw advance of 3 inches per minute is possible when using the inserted tooth saw blades.

These machines are classed by the makers as high grade milling machines and therefore, great care is exercised in their design and construction. The chief object after flexibility of control is the elimination of chatter so detrimental to the life of the saw blades. To accomplish these results the spindles are finished by grinding and supported on each end in cap bearings located each side of the driving spindle gear. The driving pinions have the teeth cut from the solid shaft and the main drive is transmitted through worms and worm

wheels; the worm wheels being of bronze and the wheels of hardened steel fitted with roller thrust bearings.

On account of the great stresses imposed by the modern rates of feed and rotation, experience has demonstrated that a positive feed is advisable and therefore on the standard machines a gear box is utilized which permits of feed changes without removal of gears. The gears in this box are distributed and mounted upon sliding sleeves controlled from latch levers. The latest practice includes belt connected motors with the motors mounted on high pedestals to give long belt centers.

The saddles on these machines have under-locking gibs cast solid, vertical and horizontal adjustments made by taper shoes throughout all parts, having opposed stresses are supported in a common casting. The saddles have adjustable automatic feed release and safety release to feed and fast power motion in each of the extreme positions. The top work box B can be placed in a number of positions to hold the work in the most advantageous position to insure the maximum possible output through performing the operations with the shortest length of travel.

Further information relating to this line of metal saw machinery may be had by requesting for catalog No. 47.

SAFETY FIRST!

We have all learned the efficiency of factory inspection and the necessity of conforming to its demands. It is better to avoid expensive changes by complying with conditions at the time of first installation. When installing a polishing lathe, if all exposed belts are avoided in the beginning, all need of covering

THE STEVENS "SAFETY FIRST" LATHE.

them is prevented when the factory inspector calls. Such a polishing lathe is shown in the cut, with the following advantage claimed: The base is constructed with wide flare, 22½ inches wide at the bottom, and the lathe may be driven from underneath, from slow-running line shaft, and without countershaft.

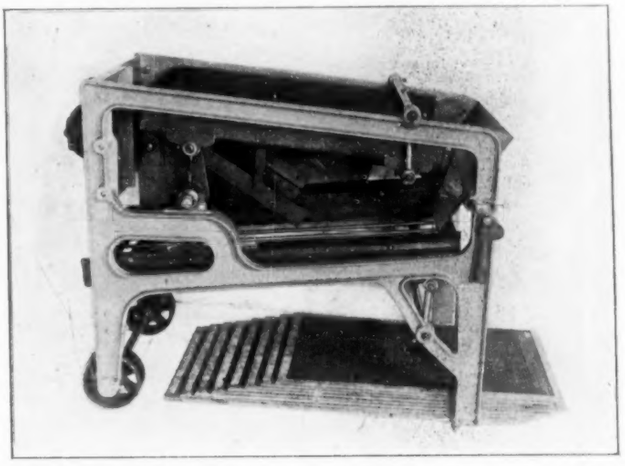
The wide base reduces vibration to the minimum. A belt shifting device is furnished, and with pulley cover on the lathe, there are no exposed belts. The pulley cover may be removed when the lathe is driven from overhead or from the rear. With the straight front of lathe there is nothing to interfere with the convenience of the workman when finishing long or bulky pieces. Chain oilers are supplied, and under each bearing is an oil-well, holding one quart of oil, which lasts a month or more. Spindle is 56 inches long, 1⅝ inches in diameter in the bearings, and 1¼ inches in diameter between flanges, made of crucible steel, turned and ground with accuracy. Bearing box is 15 inches long with 8 inches actual bearing surface.

These lathes are manufactured by Frederic B. Stevens, Detroit, Michigan.

THE VICTOR SCREEN

The Victor screen, here illustrated, manufactured by H. S. Vrooman, Chicago, Ill., attracted a great deal of attention at the exhibition of foundry supplies in the Chicago Amphitheatre.

The machine as shown has two screens, one above the other. The screen frames are pressed steel mounted on bronze brackets and supported on seamless cold-drawn tubing, case-hardened.



THE VICTOR SAND SCREEN MANUFACTURED BY H. S. VROOMAN, CHICAGO, ILL.

These frames are pivoted in front on swinging links, and in the rear on a pair of rocker arms keyed to the main drive-shaft, which is supported on the bronze boxes. The side frames are cast iron, and the rear legs are set on 6-inch pulleys. In front, between the side frames, is a movable steel chute, which can be used in an upright or the alternative position. The driving mechanism consists of a diamond roller chain, a large steel sprocket, a small sprocket, case-hardened, a bronze eccentric strap, and a crank arm. This driving mechanism is all enclosed in a housing 2¾ inches wide. The motive power is furnished by a ¼ H. P. alternating or direct current motor. The Victor screen is 4 feet long, 26 inches wide, 34 inches high, and weighs 475 pounds. The size of the top screen is 30 by 19½ inches, size of bottom screen is 37½ by 19½ inches. Four sets of heavy steel wire metal bound screens of different mesh are furnished with each machine.

This screen is fully described in a catalog issued by Mr. Vrooman, a copy of which will be sent upon request.

ISCO SPRAYER

The sprayer shown in the illustration is said, by the manufacturer, to be one of the most effective and durable sprayers now on the market.

THE ISCO SPRAYER.

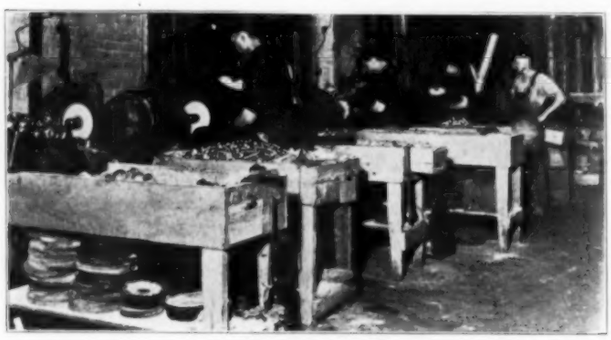
It is a machine that is used for applying all kinds of paints, enamels, lacquers, varnishes, etc., on any surface regardless of its kind and shape. This sprayer is manufactured from the best of materials and is silver plated on the inside to prevent corrosion and nickel plated on the outside to admit of easy cleaning.

The International Spray Company, of New York, N. Y., who manufacture the Isco line of sprayers, also list a complete line of accessories, including air compressors, tanks, hoods, and in fact, all of the various important parts of equipment that is essential for the spraying of surfaces with liquid of any description.

GARDNER POLISHING LATHE

The photograph shows the installation of the Gardner Machine Company's polishing lathes in the plant of the W. D. Allen Manufacturing Company, 1821 Western avenue, Chicago, Ill.

Three of these lathes, which are known as the No. 3 motor-driven polishing lathes, were installed some time ago and give excellent satisfaction. These lathes carry a d. c. variable speed motor which has a rating of 4 H. P. constant duty and 6 H. P. intermittent duty. The motor is supplied with special end

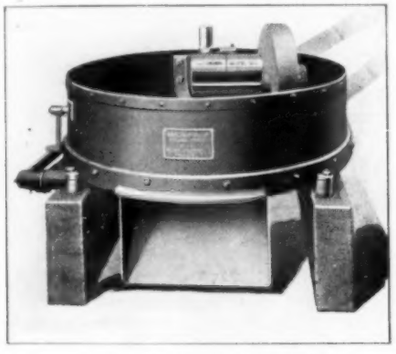


AN INSTALLATION OF GARDNER MACHINE COMPANY'S POLISHING LATHES.

frames of extra rigid design and fitted with S. K. F. ball bearings. On the majority of the work a speed of about 2,000 r. p. m. is used. It is pointed out by the makers that these Gardner polishing lathes use much less power, and because of their design and construction, enable an operator to get out more work in a given time than could formerly be done on the old style lathe, and it is also stated that because of the smooth running qualities and increased life of the buffs, a better finish can be secured. The Gardner Machine Company, Beloit, Wis., manufacturers of these lathes, make a complete line in all sizes and types. Ball bearings are used in their belt driven machines, as well as in their motor driven machines.

FOUNDRY MIXER

The Simpson intensive foundry mixer herewith illustrated consists of a circular pan 4 feet in diameter by 18 inches deep. The pan is stationary and the central shaft revolves, which carries a series of plows and one muller or roller. The plows turn over



THE SIMPSON MIXER.

and move the material alternately inward toward the center and outward toward the rim, while the muller revolves and moves over the mass of material. This movement of the muller follows the turning over of the mixture by the plows. The action of the latter, together with the kneading or squeezing action of the muller results in a thorough incorporation of all the elements of the mixture, regardless of its composition.

For example, in the case of mixing facing sand, the new molding sand in its lumpy natural state, either dry and hard, or wet and mushy, and without being previously riddled, may be thrown into the machine with old sand and will be so thoroughly mixed that no new sand particles will be seen after a few minutes of mixing in the machine.

This thoroughness in the mixing qualities of the Simpson mixer, it is claimed, results in a great saving of new sand or binder, because a very small percentage of new sand will reclaim a very large percentage of old sand, thus effecting great economy, both in the saving of labor and in the cost of new sand or binder.

For further particulars regarding these mixers address the manufacturers, The National Engineering Company, Chicago, Ill.

HAUCK KEROSENE TORCH

A kerosene torch of new and novel design, as shown in cut, has just been placed on the market by the Hauck Manufacturing Company, of Brooklyn, N. Y.

It was especially designed to take the place of the gasoline torch. The most important feature is the construction of the bronze burner. The oil passage ways are especially large and

THE HAUCK KEROSENE TORCH.

so arranged that only one plug has to be unscrewed in order to clean the whole burner instantly. By a special oil regulating valve the flame can be adjusted to any size from 8 inches long by 1 inch in diameter to the finest point. The torch is suitable for brazing and soldering heavy wires, melting soft metals, shrinking and expanding, thawing out frozen pipes, burning off paint, drying molds and cores, etc. The torch is also furnished in connection with a light furnace for melting solder and heating soldering coppers.

SAFETY SET SCREWS

The Bristol Company, Waterbury, Conn., has recently put on the market a new improved line of "Bristo" patented safety set screws. This is manufactured under the Goodwin patent of October 14, 1913, and the patented design, six dove-tailed slots inside the hollow head of these safety set screws, and six corresponding flutes on the outside of the special wrenches used with these. The dove-tailed design is such that when these set screws are set up hard with the special wrench, the wrench gives the screw a true rotary motion without the usual tendency to expand and crack the hollow head. The angles of the surfaces of the slots are such that there is even a tendency for the wrench to contract or compress the head of the screw.

These screws are manufactured in a great variety of sizes. A special treatment process is used which makes the screws glass hard on the outside and extemely tough on the inside, and samples have been found in actual test to be 100 per cent. stronger than the old hex style set screws. The "safety first" movement has progressed so far that great attention is now being given to changing the design of machinery to protect human life and the elimination of the old style set screws with projecting heads is one of the things which safety engineers and insurance inspectors insist on.

Associations and Societies

REPORTS OF THE CURRENT PROCEEDINGS OF THE METAL INDUSTRY ORGANIZATIONS.

NATIONAL ASSOCIATION OF BRASS MANUFACTURERS

Wm. M. Webster, commissioner, has announced that the new official catalog of the association will be ready for distribution about January first, when the new list prices will go in effect. Commissioner Webster in connection with this catalog, states that the sales now run close to eighty-six thousand copies and that the original issue will probably be fully subscribed for in a very short time.

He has sent a letter to each member of the association telling why it has been found necessary to raise the price of the catalog after the original contract has been filled. That is to say after the total number of catalogs contracted for has been supplied further copies will have to be charged for at a higher rate. The reasons for the above are due to the fact that the price of the original catalog was based on a book of one hundred and ninety-two pages, while the actual size has turned out to be two hundred and sixteen pages. Also, owing to the war troubles, the printers advanced the price, so members are advised that they should get their orders for the catalog in early in order to avoid paying the higher price.

AMERICAN ELECTRO-PLATERS SOCIETY

New York Branch—The regular monthly meeting of this branch was held on Friday evening, October 23, 1914, at the Broadway Central Hotel. After the regular business a paper was read by William Voss, of Brooklyn, N. Y., explaining a simple method of testing chemicals used in the plating room. The following were elected to membership. George Gehling, active member, Thomas Brown, associate member and Joseph Reuter, active member. It has been decided to hold the annual banquet in connection with the Newark Branch, Saturday evening, February 20, 1915. The next meeting of this branch will be held at the above hotel on November 27.

PERSONALS

ITEMS OF INTEREST TO THE INDIVIDUAL.

Hugh Baxter, formerly foreman plater with R. Newman & Company, Newark, N. J., and with the Jenkins Manufacturing Company, Bloomfield, N. J., has bought out the plating business of the Morehouse-Dalton Company, 34 Mechanic street, Newark, N. J.

Ferdinand Deming, of Waterbury, Conn., the well known expert in the manufacture of seamless brass and copper tubing, has become associated with the National Brass and Copper Company at Lisbon, Ohio. Mr. Deming has had a wide experience in the metal business and is the designor and inventor of a number of machines and processes for the production of seamless metal tubes twenty inches in diameter and over.

DEATHS

ALFRED SANG

Mr. Sang, for some years a resident of Pittsburgh, and once vice-president of the Garland Corporation, died on October 13, from wounds received in the siege of Antwerp. He was a lieutenant in the English bicycle corps and had been in active service since the British declaration of war. News of his death was received by the Garland Corporation, Pittsburgh, whose confidential agent he was in London. He was born in Paris, in 1874, of English parentage, and was graduated from a leading French technical school. In 1900 he located in Pittsburgh, becoming a member of the Garland Corporation. He was one of the first in this country to recognize the value of Sherardizing. He was a very progressive analytical chemist, and made some important discoveries and improvements in the Sherardizing process. In June, 1909, he returned to Paris, taking over the Sherardizing patents for France, and established a plant; thence to London, where he formed the firm of Sang & Russell, metallurgical engineers. While in Pittsburgh, he was a member of the Engineers' Society of Western Pennsylvania, the American Society for Testing Materials and of the Electro-Chemical Society. He was particularly well known in this country as a writer on metallurgical subjects. A number of articles from his pen have appeared in THE METAL INDUSTRY. He paid special attention to corrosion, and is the author of books on that subject and on galvanizing. He leaves a widow and three children.

JOSHUA HOWARD MILLETT

Joshua Howard Millett, president of the Crosby Steam Gage and Valve Company, Boston, Mass., died at his home in Malden, Mass., October 14 at the age of 72. Mr. Millett was born in Cherryville, Maine, and graduated from Colby University. After practising law for many years in Boston he retired in 1895 to devote his time to the operations of the concern of which he was the head.

Mr. Millett took great interest in the civil affairs of the town in which he lived and was also a member of a large number of societies both social and historical. He was patron of art to a considerable extent and many fine paintings found place in his home.

Besides a widow, he leaves a son, Charles H. Millett, who was associated with him in business, and a daughter.

Andrew J. Cohen, first vice-president of the Merchant & Evans Company, Philadelphia, and chairman of the metal committee of the National Hardware Association, died suddenly October 11 at the Hotel Knickerbocker, New York, following an attack of heart disease. He was born in Philadelphia, was a student at the Doctor Faries School and later attended the University of Pennsylvania. He leaves a widow and a daughter.

Henry Heppenheimer, a retired dealer in metals, formerly in business on Marcy avenue, died October 17 at his home, 515 Eighth avenue, Brooklyn, N. Y. Mr. Heppenheimer was born in Frankfort-on-the-Main, Germany, May 25, 67 years ago. He was a member of Beethoven Lodge F. and A. M. and of the Harlem Benevolent Society. He leaves his wife and eight children.

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS AND TRADE ITEMS OF INTEREST FROM THE DIFFERENT INDUSTRIAL CENTERS OF THE WORLD.

WATERBURY, CONN.

NOVEMBER 2, 1914.

There is some slight evidence of a change for the better in the condition of Naugatuck valley industries. This dates from the early part of October, but it is little more than "spotty" yet. In Waterbury conditions are as bad as they ever have been in the past twenty years. Outside of Waterbury there is evidence of the same conditions, although there are probably fewer cases of distress. Torrington's mills are operating under fairly favorable conditions. Winsted's have a few cases resembling prosperity. Thomaston is just going along with greatly shortened payrolls. Seymour, Ansonia, Derby and Shelton report conditions that are far from satisfactory to merchants, landlords or workingmen, besides the manufacturers. At the same time there is a spirit of optimism, a dogged spirit that seems determined to make the best of conditions and which is certainly not discounting even the merest signs of better times. There are too few good prospects right ahead and the outlook, generally, is enveloped in darkness that is continually augmented by the clouds from the war zone.

Two prospects have been well weighed by the manufacturers hereabouts during the past month. One is the South American trade. The other is the trade which Europe's industrial nations have lost on account of the war. Both are unsatisfactory as far as immediate progress is concerned.

As regard the South American outlook, manufacturers here have concluded that whether or not they are in a position to win South American trade that has been going to Europe, they must first have salesmen who can compete successfully with other salesmen in that field. It is not easy to pick up a staff of such men, train them to the line of goods produced in New England, and expect prompt results. Here is one great obstacle to immediate progress in South America. Another, whose importance is put first by many manufacturers, is the necessity of adjusting business to meet the needs of the South American market—the greatest of which is long credit. The manufacturer who must pay high prices to retain skilled labor and high prices also for unskilled labor, must be prepared to meet great payrolls weekly and consequently he must demand prompt payment for his goods. That is why the practice of encouraging the discounting of bills has become increasingly popular. It is recognized by the conservative New England manufacturer that to meet the terms with which the South American market is familiar he must make radical changes in his method of financing his business. He will be extremely careful that none of his experiments are too radical even if he has to let the prospects fall into other hands. "Watchful waiting" is a better policy than biting off more than one can chew.

One must not think that New England doesn't care for South American patronage. Some day it will have much more of it than it has now, because the New England product will be the product that South America will demand, the better acquainted her people become with quality.

Manufacturers have various ideas about banking, but they adapt their business to the banking facilities at hand and attend to manufacturing. That's why they are not undertaking to reform banking for the purpose of giving South America more time to pay. It will be a great boon to the industries of this section, undoubtedly, when it is possible for the manufacturers to sell on long term credit. That's up to the bankers.

What good news there is about prospects in general comes from the machinery makers. These are busier now than they have been for several weeks and there are some signs that the boomlet will continue for months. This is due to some rush orders for machinery, much of which is needed by concerns which are filling orders for war goods. Cartridge-making machinery for New England concern is in demand and the Waterbury Farrel Foundry and Machine Company has several good-sized orders which will keep its forces busy for weeks on a full time schedule. The E. J. Manville Machine Company also has numerous machinery orders and some of the smaller concerns are busy on odd contracts of the same nature.

Very slight increases in orders have been reported in other lines. There has been some headway made, and some of the departments or factories which have been operating on four or five-day schedules have gone back to six-day schedules, but not with full payrolls. There are few shops large or small operating on full time even with greatly reduced payrolls. The number of hands employed is from twenty-five to sixty per cent. of capacity in most shops.

Such increases as have been reported seem to be due not to the war more than to other causes. The machinery orders are due chiefly to the war.

Interviews given out this week by several Waterbury manufacturers furnish a fairly good report of conditions in all the local metal industries:

E. O. Goss, general manager of the Scovill Manufacturing Company, declared that business for the past few months had been extremely dull. The war has had a most depressing effect on the business of the Scovill Company. Owing to the effects of the war on foreign exchanges the foreign business of the company has been considerably impeded. Mr. Goss is of the opinion that the tone of business is becoming better and there is a hopeful outlook.

W. E. Fulton, of the Waterbury Farrel Foundry and Machine Company, declared that the months of July, August and September brought business so low that the company considered closing down. October saw a revival and, if the present activity continues, there will be full time for some time to some. Prospects seem brighter and the manufacturers everywhere seem to be hopeful of a steady return to normal conditions.

The Waterbury Clock Company reports that business is good. The war has had no effect on their lines. The market is steady and the outlook good. There have been increases steadily since September began. This is borne out also by the revival of business in the Gilbert Clock Company's plant in Winsted, where orders are good enough to keep the various departments working full time.

At the Plume & Atwood Manufacturing Company's plant it is reported that the war's effect is not noticeable, but that the general lull in industry is keenly felt. The forces of the company are greatly curtailed on account of the dullness, but there is hope for a revival soon. This company is looking after South American prospects and hopes to take orders there in the near future.

J. Hobart Bronson, president of the Oakville Company, reports optimistically, though he admits there is no prospect of immediate improvement. His company is trying to revive the American market and also to make new customers in the South American field.

The Berbecker and Rowland Manufacturing Company reports an outlook that is far from pleasing and great depression. George A. Driggs, its president, does not blame the war as much as conditions generally throughout the country. It is his opinion that if the interstate commerce commission should increase the freight rates the five per cent. asked by the railroads all business would be helped. The American Brass Company finds conditions dull and unsatisfactory generally and holds internal conditions here in the United States as responsible as any other cause.

Comparatively little gets into the business reviews about the Colorado situation, but there is no doubt that this has considerable effect on all metal industries and that the sooner it is cleaned up permanently the better it will be for them all. Whatever it may be called, the condition that exists in Colorado is regarded by New Englanders generally as akin to if not really anarchy and it is bound to be a serious handicap on business revival when other adverse conditions are removed.—F. B. F.

NEW BRITAIN, CONN.

NOVEMBER 2, 1914.

As a result of the European war the metal manufacturing conditions in New Britain are most complicated. Not in a score of years have business conditions been any worse at the factories than they have been of late. Republican politicians claim that the business depression is due to the Democratic administration and the Democratic tariff measures. Democratic politicians assert with equal vehemence that the hard times are not due to any legislation of the party but to the European war which has closed the markets of the world. Other manufacturers explain the situation as resulting from the methods of the money interests in addition to the war across the Atlantic. They claim that the monied interests are sitting tight, watchfully waiting and at the same time hoarding up the money which, as a result, holds up trade.

There is much to be said on all sides but a non-partisan's opinion is that the European war has played havoc with business, especially since many of the factories had extensive commercial dealings with foreign nations, particularly with Germany, to which it is now practically impossible to ship any goods. Another logical reason for the depression is the inability of some manufacturers to import their raw materials from abroad. Thus, without fear of contradiction it may be said that the European war has had a highly demoralizing effect on the metal industry here.

Practically every large concern has reduced its working hours and hands and in some instances the wages have also been cut, one concern making a ten per cent slash in the salary of the high-priced men. A few of the factories have gone on to longer hours in some departments and the Traut & Hine Manufacturing Company is working a full schedule of fifty-five hours. As this concern makes metal novelties, suspender and garter buckles, etc., which are in demand to supply the Christmas trade this may account for the gain.

A good idea of the prevailing conditions at one factory, resulting from the war, may be gleaned from a statement made by a high official of the Stanley Rule & Level Company, which had a big foreign trade. Only today he said: "We could shut down our entire plant today and not reopen until January first and not suffer." By this he meant that the stock on hand would be sufficient to supply the meager orders which are coming in at present. At this same plant every female office employee has been compelled to take an enforced vacation of two weeks, without pay, as one means of economizing on the payroll.

When the war broke out abroad it was immediately felt here as the representatives of many manufacturers at once cabled their home offices stating that some of their large orders must be cancelled. But from this it must not be assumed that everything is in a state of chaos here. During the past two weeks it is said that business has picked up a trifle, due possibly to the fact that conditions are readjusting themselves. At the Russell & Erwin division of the American Hardware corporation business is said to be fairly brisk and the Stanley Works are continuing work in constructing new buildings.

On October 20 the directors of the North & Judd Manufacturing Company held a regular quarterly meeting at which it was voted to create three new offices and the following men were elected to fill the same: Second vice-president, Herbert A. Johnson; assistant treasurer, Frederick M. Holmes; assistant secretary, Colton D. Noble. This action is in line with the well known policy of the management in recognizing the ability among the younger men in its employ who have shown themselves capable of filling positions of responsibility and trust.—H. R. J.

BOSTON, MASS.

NOVEMBER 2, 1914.

Business in the metal working shops of Boston shares in the general condition industrially in this section, outside of the woolen manufacturing plants, which are about the only ones that have nothing to complain of. It is estimated by close observers of the situation in Boston and vicinity that about 60 per cent. is a fair calculation relative to the amount of productive capacity employed in a majority of cases. This estimate is gained from the conclusions of dealers in bituminous and steam coal, reports of purveyors of household necessities, of wage workers and from the salesmen in various lines of trade.

To what extent this condition of affairs is due to the war in Europe few manufacturers are prepared to hazard a statement. Some are disposed to date its inception back to a period before the war, and to consider the latter as merely incidental to other factors. It is admitted that platers are hampered somewhat by increased cost of chemicals, and in one instance a dealer in brass and copper products stated this week that one of his best customers had lost a large part of an export trade that the concern had built up with a European house in the war zone.

On the other hand, the fact was pointed out that copper is cheaper. The main factor in the metal trades in this city remains, as for some time past, the labor element, cost of which has a direct bearing upon the obtaining of contracts, in many instances.

Secretary Young of the Metal Trades Employers' Association, representing the F. N. McIntire plant, of 167 Oliver street, states that interior finish, in such lines as the plumbing trade, for instance, is relatively quiet, and that this description would apply probably to the brass trade in general, and to office fittings and grill work, also in some degree to lighting fixtures.

At the Hodgdon Metal Works some of the effects witnessed in the retarding of trade were declared to be due to money stringency and the inclination of bankers to refrain from financing new projects as freely as usual. Little that could be attributed to the war in the way of gains in industrial activity in metal lines is known to have occurred in this city. One extra expense, on the other hand, is the added cost of brushes and of some chemical products.

The Tuttle Silver Company, which recently added more floor space to its plant, is making reproductions of silverware of the colonial period, and producing many patterns of the time of Paul Revere. Its output is increasing, not only in this direction, but in the line of prize cups.

Another concern that has no fault to find with the volume of business, but also finds no war influence traceable in the trend of events in the trade, is that of Walter I. Cowlishaw, who makes prize cups his specialty and hails the advent of bowling, football and other winter sports, being obliged to work overtime to fill orders this month.

The Metal Trades Employers' Association will hold its first fall meeting next Monday night and discuss trade topics.—J. S. B.

ATTLEBORO, MASS.

NOVEMBER 2, 1914.

The volume of business being done by the local jewelers is below normal but returning salesmen have brought enough orders to keep the shops busy for a few weeks. Several of the firms, however, who have been working overtime have caught up with the work and therefore are not running evenings. Buyers have been in town for the past week and their orders while not as large as in a normal season are very gratifying and serve to buoy up the hopes of the manufacturers. Probably the busiest shops in the district are those which make silver goods and novelties. The bulk of this business is of the small order variety but there are lots of them.

Besides being a factor in the depression of business the present war in Europe is the reason for the inability of some manufacturers to fill orders which have been received. The unsettled conditions make it impossible to import stones, amber, potash, pumice, watch crystals, walrus hide, chamois skins and certain lines of cutlery among which the most important are scissors.

Edward A. Sweeney, president of the W. H. Wilmarth Com-

pany, in an interview last week spoke optimistically of the situation and predicted that the present war in Europe would be of benefit in certain lines to the jewelry workers of this country. He said that it would be necessary for the manufacturers to make chains which they had been importing from abroad and that machinists would be called upon to make machines which the European countries had been furnishing.

The jewelry manufacturers of Attleboro, North Attleboro and Plainville have been invited to place exhibits with the Providence jewelers at the world's fair in San Francisco in 1915. The Providence Chamber of Commerce has 25,000 feet of floor space at its disposal and it is probable that several of the manufacturers in this district will take advantage of the opportunity offered them to secure national advertising at this exhibition.

A number of the jewelry firms have contributed to the Buy-a-Bale cotton fund in response to letters sent out by Leonard Krower, a wholesale jeweler of New Orleans.

The L. G. Balfour Company, of Attleboro, has been granted a certificate of incorporation from the State Commission of Corporation. The company is organized to buy, sell and manufacture jewelry. The firm is capitalized at $50,000.—C. C. C.

NEWARK, N. J.

November 2, 1914.

While the imports have been shut off from foreign countries in lines that have been made a great deal in New Jersey, Pennsylvania, etc., there has also been a great falling off in exports, which has helped to create poor business conditions. There are a few lines that are busy and these are lines that contribute to the war material in some way or other, not only in this country, which has also been preparing in a quiet way, but in the foreign countries as well.

However, conditions are only about 50 per cent. good, that is about one-half has been cut off on the whole. A great opportunity is open to American manufacturers to get in Central and South America. There is a demand in those countries for gold and silver plated goods, cheap and medium priced jewelry, findings, watches, plating materials, pearl lines, and metal novelties made of brass, bronze, aluminum, etc. There is also a call for small tools and machinery. There are not many factories in that section of America and they will depend to a considerable extent on the United States. The Newark Board of Trade proposes to establish a warehouse and to send salesmen to South America to push this business, as the proposed American banking and shipping facilities will greatly aid the movement. Similar movements have also been started in Philadelphia, Buffalo, Detroit, Cleveland, Pittsburgh and other cities.

The cutting off of foreign importations will considerably benefit in time the making of cheap jewelry, plated goods, etc., which have been brought in from Germany, France, Austria, Belgium, etc. Also American watches to take the place of Swiss watches, jewels, chemicals, brushes, metal novelties, etc. Some firms are preparing to make chemicals which lines are almost altogether imported. Quotations on bristles for brushes have been withdrawn and the brush factories are hard hit. The brass and steel wire brushes are not affected, however. Platinum is getting scarcer and in a few months there will not be much on hand. The importation of colored and semi-precious stones has hurt a great deal the making of 10 karat jewelry lines, rings, etc. There will be more of a demand for the cheaper grade of American clocks as these were formerly largely imported. The pearl button industry of Newark has been nearly killed by the low tariff, which enables the Japanese to flood the American market with buttons. The Japanese work for about fifteen cents a day, while the Newark workman gets $2 to $3 a day. On account of the general depression in business there has not been any increased demand for American articles.

The jewelry factories here generally start in September and work night and day to keep up with the demand for Christmas lines. This year there is not much demand and up to the present time, the factories are working on half time, some are practically closed up and a great many people are out of work. There is no rush except in some of the cheap lines of gold and silver goods, while the higher grade lines are neglected.

The E. C. Thru Company has been organized at 391 Mulberry street, to manufacture a line of woven gold, brass, German silver and silver-plated wire napkin rings, and other novelties. These goods are made of woven wire, the machine for which was invented by Joseph Natterer, superintendent of the plant, and who was formerly with the Riley-Klotz Company, of this city.

The Cooke plant at Paterson, N. J., have turned out a huge locomotive for the Kiang San Railway of China and which will be exhibited at the Panama-Pacific Exposition at San Francisco. The interior of the car is finished in nickel and the boiler coverings are of copper. Robert Williams, foreman of the Cooke plant, will accompany the engine to the coast fair.

The Newark factory of Hanson & Van Winkle is composed of twenty buildings, employing 250 hands. The anode stock room contains an average of $50,000 worth of finished nickel anodes and the finished and unfinished anode material on hand is $100,000 worth. The cotton cloth used in making buffs and wheels is kept on hand to the amount of $30,000 worth. The Chicago branch is erecting a new three-story and basement brick structure on Erie street, near Green street.

Kenneth M. Baum, formerly one of the proprietors of the Scientific Optical Company, has started in business to design machinery, promote efficiency of factories and operate a laboratory for chemical work, particularly in the line of metal working. His office is at 40 Clinton street.—H. S.

PROVIDENCE, R. I.

November 2, 1914.

With the closing of the month of October the manufacturers of machine tools and of metal work in general report a slight improvement in business although, as in all other lines, there are some of the plants which are without many orders at this time. But while there has been some improvement in trade in general throughout the metal lines, there are only a few less men out of work than there was a month ago.

The jewelry industry is showing some encouraging signs of reawakening and several of the plants are reporting new orders from various sources. A number of concerns are reaching out after the trade that is said to be in waiting in South America, because of the changing conditions brought about by the European war. One encouraging feature of the present situation is seen in the visitation of two buyers from London, Eng., for the purpose of purchasing goods and the prophesy that this country would profit to a large extent through the existing situation across the water. Business among the manufacturing jewelers is far below normal, it being estimated that fully 50 per cent. of the employes in this industry are either out of work entirely or are on part time.

Christopher W. O'Brien, refiner, on Borden street, has enlarged his plant and added two large sweep furnaces and other equipment. The Standard Machinery Company, of Auburn, is reported to be working nearly to full capacity on orders that have been received from abroad. The Providence Co-operative Sheet Metal Company has the contract for the metal work on the new Elmwood Christian Church and the Hippodrome, both in this city. John F. Lanigan has disposed of his interests in the V. E. Black Company, manufacturing jewelers, 710 Eddy street, who will continue the business.

The statue of a soldier which will be used for the Soldiers' and Sailors' Monument at Bristol, R. I., was recently successfully cast at the bronze foundry at the Gorham Manufacturing Company's plant at Elmwood in the presence of a large gathering. The figure is from a model by Henri Schonhardt and is a companion to the figure of a sailor cast several weeks ago at the same place. The soldier is nine feet in height and 2,300 pounds of bronze were used in making the casting, the pouring being under the direction of Foreman Lindsay Baird.

The model for the casting was contained in a flask ten feet long, six feet wide and five feet deep. For the past eight weeks the molders and other employees of the statuary casting room have been working on the model of the soldier, preparing for the casting. Two men worked for seven weeks making the mold which was used. This mold was then baked for four days and four nights, in order to get it into the proper condition.—W. H. M.

PHILADELPHIA, PA.

NOVEMBER 2, 1914.

Reports of a very variable nature are to be had from dealers and consumers in metals. The city is covered over with a thin blanket of depression that permeates practically every line of business, and Philadelphia makes everything from a pin to a battleship. The causes for the depression are as many as there are persons willing to expound them. The substance of it all, however, is that business is not normal, the true cause for which, according to prominent metal men here, is in the war, and not, as earnestly believed by some, the tariff. A truism of a prolific type was uttered recently in which it was stated that the highest protective tariff that this country ever had is in existence right now. There is no competition and hence there is no need for a higher tariff, according to the impression.

Copper trading is not very active because of conservatism among electrical appliance manufacturers. As this trade consumes a large proportion of copper it is having some effect on the market. It is confidently felt, however, that once the Latin-American markets open up and this country is called upon from abroad to make good the curtailed production in the war-ridden countries the copper business will be among the most active, if not actually so, in the metal trades.

The manufacturing jewelry trade in this city can hardly be said to be anything more than seasonably active. Buyers have been unusually late in placing their orders because of a conservative feeling, and those orders that are being placed are in smaller lots than formerly. Despite this fact many expect the jewelry season this year to be on a par with others, especially insofar as the consumption of metals is concerned. Gold, silver, nickel, and more particularly bronze, are playing an extremely important part in the jewelry business this year. Bronze is being used to a greater extent for many new novel ornaments.

As the larger industrial plants in this city are now working on part time all metal lines have received a serious setback. Among those in the above class are the Baldwin Locomotive Works and the J. G. Brill Car Company. At the present time Baldwin's plant is operating with 3,800 men as against 17,000 at this time last year. The machine shop of William Sellers & Company is also working under curtailed operations. This plant is now operating with 25 per cent. of its normal force. Coincident with this the J. G. Brill Car Company has placed into effect a reduction of ten per cent. in salaries of all salaried employees from the president down, while those on piece work are on part time. The intimation and the current report to the effect that these plants have orders sufficient to keep them busy, but are holding back on them so as to reflect on conditions generally has been denied by officials connected with these companies.—P. N. S.

LOUISVILLE, KY.

NOVEMBER 2, 1914.

Rather a sharp curtailment of operations in this section of the country is ascribed by the metal trade to the depression charged to the war in Europe, among other conditions Such effect as the war is having is mostly indirect except where the larger concerns are engaged in the export trade, which has, of course, been dealt a severe blow. Reduced prices of copper and brass is an effect the local members of the trade share in common with others in other parts of the country. The Stege Company noted that cyanide, used in its plating operations and which comes from Germany, has advanced, largely due to the war. The Stege Company is not inconvenienced or put to any added expense, however, because it was provided with enough of this material to last for a year's run. The foundry department of this business is slowing down, though there is reported to be an increase in the demand for plated work. Generally the metal industry in this section is looking for busy times in January and between now and then, the busy season having been somewhat postponed by the decision of the distillers not to begin their operations until that time.

An interesting business development in Louisville is the reorganization and expansion of the Beecher-Fowler Manufacturing Company, which has recently incorporated with $15,000 capital and which has taken over the plant and business of the Louisville Rubber Stamp and Stencil Company and the Arthur Jones foundry, both local enterprises. This brings the Beecher-Fowler investment to some $12,000, paid in. The business of the plants taken over will be consolidated with that of the Beecher-Fowler Manufacturing Company at 140 South Third street for the time being, though in the near future the company expects to have to move into more commodious quarters. Charles E. Beecher is president of the reorganized concern, R. C. Fowler secretary, and W. S. Beecher secretary-treasurer. The company manufactures in metals, brass signs, bronze tablets, burning brands, steel dies, box plates, etc. Business was reported to be excellent and it was stated that the company is in the market for a milling machine and a lathe, six-foot bed and two-inch swing.

Another impending change is that by which C. Hafner, now foreman of the shop of W. G. Buschemeyer, silversmith and goldsmith and worker in other fine metals, in the Starks Building, will purchase a similar business conducted by Herman Haegele, on Jefferson street. This is an old stand, formerly the Rietzer shop. Mr. Hafner has been with Mr. Buschemeyer for twenty-seven years.

The Chattanooga Copper Company officials are much elated over what is announced to be a discovery of a rich vein of copper on their property near Chattanooga. The vein of ore is reported to be fourteen feet in thickness and to extend far into the side of the mountain. Prospecting operations are continuing and the geologist in charge of the work says there is every indication of a vein as rich as those of the Tennessee and Ducktown mines.

Tennessee interests are jubilant over the outlook for zinc with the prospects that the trade of this country in those metals should begin to increase immediately in view of the suspension of exports from the continent of Europe during the war. The largest force of men employed in the zinc operations at Mascot, near Knoxville, in the history of those operations is now engaged there and great increases in the business are looked for shortly. Zinc operations around Embreeville, Tenn., also are on much the same basis and men interested in development work are looking on the war as pre-eminently America's opportunity in the zinc trade. In this connection it is interesting to note that the Embree Iron Company, of Chicago, Ill., is planning to construct a large smelting plant in connection with its Tennessee developments. At Sweetwater, Tenn., W. D. Gilman has purchased the W. D. Gilman & Company's barytes plant, and will operate it.—G. D. C.

BUFFALO, N. Y.

NOVEMBER 2, 1914.

The money market is very tight in Buffalo and the banks are very reluctant about making loans, even on notes. To some extent they are discouraging local metal concerns from making additions to their plants. This, of course, is due to their trying to safeguard against a slump. And because of the reluctancy of the banks to make loans those concerns which depend a great deal upon the banks are hampered a bit. But despite of all this, there is more optimism among the local metal men than ever before.

Electroplaters are having a very busy time and they expect business to improve for the next six months. One plater has added a number of men to his usual working force.

Copper and brass finishers are also busy. Take the Zero Valve and Brass Company, for example, they are working some of their men every night. And at the present time they are working on nearly three thousand feet of brass railing for three Buffalo High Schools besides their other work.

Foundrymen are not as busy as they might be, however, things have turned toward a decided improvement within the past month. Some are beginning to make a little profit. The Unique Brass Foundry Company has just completed an order for all the brass work for 200 Pierce-Arrow trucks; and the Buffalo Brass Foundry has just closed a contract with the Mayer carburetor people to make all of their carburetors.

In asking some of the local metal men what they thought of the future, some maintained this opinion: "Europe is in the heat of warfare with industries practically at a stand still. America will be called upon to supply the needs. The prices

of copper and other American mined metals will go up. The Europeans will have to buy at our prices if they want the goods. Therefore a big profit for Americans. Then again, local men fear that as soon as the war is over, foreign born citizens will return to Europe by the scores to see if any of their relatives are alive.

"No matter who the victor, this war will mean more liberty and higher wages for the Europeans and as a result these returned mechanics will undoubtedly stay in Europe to help build up the commercial and industrial backbone of their respective countries. This then will mean an American labor famine. Therefore we, as Americans, must prepare for such an emergency."

One of our Canadian friends' across the river has found it necessary to close his plant, namely, the Canada Foundry Company, of Bridgeport, Ont., because of the war. This plant employs nearly 100 men. At Fort Erie, Ont., the new International Register Company's plant is nearing completion.

During the past month the State Workmen's Compensation Commission was in session in Buffalo, where about 200 claims were considered. The following commissioners were present: Howard T. Mosher, Thomas Darlington, John Mitchell and J. M. Wainwright. Among the claims settled was that of Thomas P. Cunningham, an employee of the Buffalo Copper and Brass Rolling Mill.—A. W. G.

TORONTO, ONT.

NOVEMBER 2, 1914.

The following concerns were among the list of exhibitors at the Canadian National Exhibition held recently in Toronto, Ont., Canada.

The Carborundum Company, Buffalo, N. Y.; the Stromberg, Carlson Telephone Manufacturing Company, manufacturers of brass goods, Rochester, N. Y., Toronto, Ont., and Chicago, Ill.; The Standard Silver Company, manufacturers of plated and hollow ware, Toronto, Ont.; James Morrison Brass Manufacturing Company, plumbing supplies, Toronto, Ont.; Rochester Stamping Company, metal goods, Rochester, N. Y.; Crown Electric Manufacturing Company, brass and bronze electrical goods, Brantford, Ont., and St. Charles, Ill.; Booth-Coulter Company, brass and copper goods and plumbing supplies, Toronto, Ont.; the Hanson & Van Winkle Company, platers' and foundry supplies, Toronto, Ont.; Northern Aluminum Company, aluminum cooking utensils, Toronto, Ont.—H. S.

CINCINNATI, OHIO

NOVEMBER 2, 1914.

While there are not lacking signs that the numerous industrial and manufacturing concerns using large quantities of brass and copper, in normal times, are doing somewhat more business than was the case a month ago, the improvement has still not been sufficient to make the metal market any better than it was at that time. In fact, it may be said, in a word, that things are probably slower with the various foundries and other metal concerns in Cincinnati just now than they have been for a long time. One of the chief causes of this, growing directly out of the European war, is the very small amount of building going on, which has in turn caused slow business among the manufacturers of plumbing supplies, who are usually large users of metals. The machine-tool manufacturers, who are also heavy metal buyers, as a rule, are experiencing the slowest business of several years, and their purchases of metal are correspondingly small. The only manufacturers who are receiving any direct benefit from the war, so far, are those turning out woolen goods of various sorts, saddlery and harness, motors, and the like; and none of these are in this market important buyers of metals. In a word, the expected readjustment of business, by which foreign markets would be made available to local machine-tool and other manufacturers, has not yet taken place, and is still somewhere in the future; and the metal industry, in consequence, is at a very low ebb in Cincinnati.

Albert Fuhrmann, for many years a prominent figure in the metal trade in Cincinnati by reason of his connection with the Crane-Hawley Company, manufacturers of plumbing supplies, and the Murdock Manufacturing & Supply Company, manufacturers of steam specialties and similar goods, as purchasing agent, died recently at his home in Cincinnati at the age of 67 years. At the time of his death he was purchasing agent for the latter concern, and had held that position for several years. He was prominent in fraternal circles, being secretary both of his Masonic lodge and of a local council of the Royal Arcanum. His widow and three daughters survive him.

The Nolte Brass Company, of Springfield, Ohio, is preparing for the construction of a two-story addition to its plant, 20 x 90 feet, of brick construction. Architect Robert C. Gotwald is receiving bids. The addition was rendered necessary by the increasing business of the company, and some new machinery for its equipment will be purchased.

The Enterprise Aluminum Company, of Massilon, Ohio, has been incorporated with a capital stock of $50,000, for the purpose of manufacturing aluminum ware and similar goods.—K. C. C.

COLUMBUS, OHIO

NOVEMBER 2, 1914.

The general European war has had a very bad effect on the metal market in Columbus and central Ohio. The situation here is possibly no worse than in other metal centers in the country, which are very bad. Demand has fallen off to a great extent and prices are low and irregular. Some of the metal houses have taken their traveling men off the road for the time being at least, saying it is useless to attempt to sell metals at this time. Generally speaking, the war will affect the market for some time and no immediate improvement is looked for.

Copper is low and prices are scarcely quoted at all. The same is true of all kinds of brass, and aluminum is still weak but some improvement has taken place in the past month. There is a fairly good demand for Babbitt, but prices are still weak. Other metals are quiet and weak.

Papers have been filed with the Secretary of State increasing the capital of the Maiwurm Aluminum Company, of Ashland, Ohio, from $62,500 to $125,000.

The capital stock of the Reynolds Aluminum Company, of New Washington, Ohio, has been increased from $10,000 to $20,000.—J. W. L.

SAN FRANCISCO

The officials of the Panama-Pacific International Exposition report that the operations for the exposition have not abated in the slightest particular and that the exposition will open positively as specified, February 20, 1915. They report that forty nations and forty-two States and territories are getting ready and work on the entire 635 acres is rushing ahead.

Ten of the eleven exhibit palaces are completed, and the eleventh, the Palace of Fine Arts, will be ready in a few weeks. Festival Hall and the Press Building are nearly completed. The great courts are receiving sculpture and paintings and the Court of the Four Seasons is finished.

The Honduras, Canada and Idaho buildings are finished, and those of New York, Oregon, Sweden, Bolivia, Pennsylvania, North Dakota, Indiana, the Philippines, Hawaii, Maryland, Ohio, Illinois, Virginia, Washington, Wisconsin, The Netherlands, China, Kansas and Massachusetts are well along and will be ready in a short time.

In "The Zone" three of the many concessions are completed and twenty-one are in various stages of progress, with many others only a few weeks from readiness.

The mile race track is graded; the polo field is ready for the referee's whistle; the third of a mile oval cinder track with the quarter of a mile straightaway is receiving the final coat of cinders; the amphitheatre for 18,000 persons has been begun; the 435-foot steel "Tower of Jewels" is receiving its covering of 125,000 jewels; the barns for the great live stock entries are under roof; the level roadways are receiving the asphalt; trees of all climes are in place along the drives; every part of the grounds is alive with the exposition colors; the yacht harbor is ready; the great California Host Building is soon to be dedicated, and the daily paid attendance is far above 1,000, with a Sunday record established of 7,054.—P. P. C.

NEWS OF THE METAL INDUSTRY GATHERED FROM SCATTERED SOURCES

An explosion of gas in the japan finish room of the L. S. Starrett Tool Works, Athol, Mass., caused $300 damage.

The Lamb Manufacturing Company, Winsted, Conn., recently organized for the manufacture of automobile accessories, has leased half of the factory of B. J. Harrison.

The Stanley & Clements Foundry Company, manufacturers of brass, bronze and aluminum castings and metal patterns, has located at 1635 Madison avenue, Grand Rapids, Mich.

The American Brass Company has purchased at Waterbury, Conn., the De Lucia property which that city did not want for the proposed improvements in the Brooklyn district.

The Spring City Foundry Company, St. Paul avenue, Waukesha, Wis., announce that the new addition, 60 x 112 feet, which they are erecting will be completed about December 1, 1914.

Robert Kann, chemist and metallurgist, has moved his laboratory from 62 Gold street to 124 Front street, New York, N. Y., where new and enlarged quarters give him better facilities for carrying on business.

The Farrel Foundry & Machine Company, manufacturers of rolling mills, cabbaging presses and cinder crushers, Ansonia, Conn., has awarded the contract for a factory which will be used for storage and as an erecting shop.

The McKinney Manufacturing Company, North Side, Pittsburgh, Pa., manufacturers of hinges, barn-door hangers and other metal specialties has bought the patents and equipment for manufacturing the Glen folding steel door mats.

The Delaware Foundry & Machine Company, Delaware, Ohio, have started the erection of a brick building, with steel trussed roof and steel windows. The company expect to have the building finished by the first of December of this year.

As an interesting example of the broad business policy of some concerns in the metal business, the trade press reports that the Frictionless Metal Company, Chattanooga, Tenn., have adopted the practice of accepting cotton for goods sold in the South.

The Andrew Messmer Manufacturing Company, manufacturers of brass goods and temporarily located at 1120 Bank street, Cincinnati, Ohio, is remodeling its old plant on Patterson street, but the company states that they will be back in their plant in about a month.

The Chicago Bearing Metal Company, operating a brass foundry at 2234 West Forty-third street, Chicago, Ill., will erect a one-story brick addition to its plant which will cost $4,000. Besides the brass foundry this company operates a machine and pattern department.

The Quigley Furnace and Foundry Company, Springfield, Mass., announce that they are now making a specialty of furnishing high-grade, special-mix castings of various compositions, especially suitable for melting pots, kettles, annealing boxes, ingot molds, acid-resisting purposes, etc.

The National Lamp Works, manufacturers of lighting fixtures, Cleveland, Ohio, has completed the erection of a group of factory buildings off Ivanhoe road, East Cleveland, and which includes a sheet metal working factory for the manufacture of light fixtures, a glass making plant and a power plant.

D. B. Moyer announces that since his withdrawal from the Detroit Platers' Supply Company, which concern, he states, has gone out of existence, he has established himself at 157 Tennyson avenue, Detroit, Mich., as a manufacturers' agent, representing manufacturers only. He will make a specialty of nickel anodes.

The P. Lowentraut Manufacturing Company, Newark, N. J., was reorganized on October 5, 1914, when the following officers were elected: F. J. Woodring, president, Mrs. Anna Lowentraut, vice-president and F. J. Greenberg, secretary and treasurer. The company will establish a plant in Newark for the manufacture of ice skates, mechanics' tools, household hardware, etc.

The Electric Metals Company, Indianapolis, Ind., are manufacturing at their plant, under the Buckman patents, electric melting, smelting and refining furnaces of various descriptions. They also specialize in small, moderate-priced furnaces for brass foundries, phosphor bronze and alloy producers and anode manufacturers. This company also operates a completely equipped experiment station for testing out smelting and refining projects.

Smith, Brannan & Strein, electro platers and polishers, Newark, N. J., are now operating the Rojas process on a commercial scale and are doing work for the jobbing trade. In addition to the Rojas process they also work gold, silver, nickel, brass and copper oxidizing, polishing, etc. The above company was first organized six months ago at 129 Oliver street, but owing to increasing business they found it necessary to engage larger quarters and are now occupying 1,600 square feet of floor space at 103-109 Oliver street. Mr. Smith looks after the commercial end of the business. Mr. Strein is the foreman plater and Mr. Brannan is the foreman polisher.

Brush manufacturers report that they are having great difficulty in securing a supply of bristles on account of importations from Europe, where a large part of the supply comes from, being stopped. Some of the best grades come from the vicinity of Warsaw where fighting is now in progress. The French bristle industry is also seriously affected, and shipments from Germany have ceased altogether. Even the importations from China are seriously affected on account of the interruptions to transportation. As a result of these conditions, the price of bristles has advanced to a high figure and brush makers predict still further advances which will, of course, affect the consumers of brushes quite seriously.

Arrangements have been made through the Secretary of State of the United States by the Roessler and Haslacher Chemical Company whereby shipments of cyanide of potassium from Germany to the United States are to be resumed and it is reported that 1,000 tons are available for immediate shipment. The company's plant at Perth Amboy is running at full capacity. As soon as shipments now en route are received the pressure regarding this chemical in the United States will be relieved and shipments can be made to Mexico. The American Cyanamide Company plans to be in the market by January with American made cyanide. Prices of cyanide in the United States have gone up much less than was to be expected as shown by the Nevada Mine Operators' Association having contracted for the next year's supply at 15½c., which is only one cent more than the price for the current year.

WATERBURY, CONN.

"Waterbury Has Something on Everybody" is the slogan recently adopted by the Waterbury Chamber of Commerce. The great diversity of its industries is reflected in the report of the United States Census Bureau of 1909, in which the following industries are reported, to wit:

Brass ware, brass and copper rolled, bread and bakeries, buttons of every description, carriages and wagons, electrical machinery and apparatus, foundry and machinery, automatic machines of every description, hardware, etc., lumber, doors, casings and all kinds of dressed lumber, mattresses, spring beds, mineral and soda waters, printing and book-binding, sausages, stamped ware, silver and silver plated ware, tobacco and cigars, awnings, tents and sails, book-binding, boot and shoe finding, boxes, fancy and paper; brass castings, brass finishing, clocks, Ingersoll watches, women's clothing, confectionery, copper-

smithing and steel iron work, cutlery and edge tools, flour and grist mill products, gas and electric lamps, fixtures and chandeliers, grease and tallow, hosiery and knit goods, instruments, both measuring and recording, professional and scientific instruments, iron and steel forging, lamps and reflectors, malt liquors, marble and stone works, models and patterns, monuments and tombstones, needles, pins, hooks and eyes, paint, patent medicines and compounds, rubber and elastic goods, soap, stationery, chemicals and acids, tools, upholstering materials, wire, wire rope and cable, insulated wires, seamless and brazed copper, brass and German silver tubing, wood, turned and carved.

NEW YORK ELECTRICAL SHOW

A very successful electrical show was held under the auspices of the New York Edison Company at the Grand Central Palace, New York, N. Y., October 7 to 17, 1914.

Some of the notable features of the show were the exhibitions of electrical units for various forms of manufacture. Possibly those which attracted the most attention from the very large attendance at the show were the exhibits of machinery typical of the equipment of the United States mints and of the Frankfort arsenal, Frankfort, Philadelphia, Pa. These two exhibits are shown in our photographs. The equipment illustrative of the United States mint consists of furnaces for melting and pouring, machinery for cleaning, shearing, punching, milling, annealing,

Photo courtesy N. Y. Edison Company.

EXHIBIT OF CARTRIDGE MAKING MACHINERY OF THE FRANKFORT ARSENAL AT THE NEW YORK ELECTRICAL SHOW, NEW YORK, OCTOBER 7-17, 1914.

welding, drying and testing, and finally the weighing of the finished coin, while the equipment for the Frankfort arsenal consisted of stamping and drawing presses and trimming machines, and in fact, all of the machinery necessary for producing a finished cartridge.

Other interesting exhibits at the electrical show were a complete electrically-operated kitchen, bakery, laundry, cigarette factory, chocolate producing shop, and a chicken incubating plant. The illuminating end of the electrical field was fully illustrated by the many exhibits of various forms of electrically operated lamps and searchlights.

Photo courtesy N. Y. Edison Company.

EXHIBIT OF MACHINERY USED IN UNITED STATES MINT AT NEW YORK ELECTRICAL SHOW, OCTOBER 7-17, 1914.

INCREASE IN CAPITAL STOCK

The Lumen Bearing Company, Buffalo, N. Y., has increased its capitalization from $200,000 to $300,000. The $100,000 increase will be issued in the form of 7 per cent preferred stock.

The Galt Brass Manufacturing Company, Ltd., Galt, Ont., has been granted letters patent to increase its capital stock from $40,000 to $100,000; and to change its name to that of the Galt Brass Company, Ltd., which will make it more convenient for the company to put its name on their goods.

The James A. Spargo Wire Company, Rome, N. Y., has increased its capital stock from $50,000 to $200,000 as a preliminary toward consolidation with the Spargo Wire Cloth Company, both being under the same ownership and management. The statement is made that the name of the combination will be Spargo Wire Company. It is the expectation to add 100 looms to the present plant of 100 looms, weaving brass, copper and bronze wire cloth. The consolidated company will thus start with the drawing of wire in making its finished product.

DIVIDENDS

The National Lead Company has declared regular quarterly dividend of 1¾ per cent. on the preferred stock, payable December 15.

The American Brass Company, Waterbury, Conn., have declared their regular quarterly dividend of $1.50 per share, payable November 2.

The Bristol Brass Company, Bristol, Conn., have declared its regular quarterly dividend of 2 per cent with an additional dividend of ½ per cent which came as a surprise to the stockholders as general trade conditions are poor, especially in the brass industry. The company, however, reports that at its rolling mill in East Bristol, Conn., the men are working on full time, six days a week, and the prospects look good for a continuance of good times.

BUSINESS TROUBLES

The final meeting to adjudicate the Chicago Stamping and Tool Company, was held in Chicago, Ill., on November 4, 1914.

A final meeting of the creditors of the Herman Stier Manufacturing Company, Chicago, Ill., was held in that city on November 4, 1914.

Walter Wood has been named as receiver for the firm of R. D. Wood & Company, manufacturers of cast-iron pipe, hydraulic machinery and gas-making machinery, Philadelphia, Pa., while M. Hampton Todd has been appointed to act as co-receiver. Haulings Lippincott was appointed as receiver of the Camden Iron Works and Harold Wells as receiver for the Florence Iron Works. It is stated that Mr. Wood, the president of these two companies, took this step to protect all parties interested and as a result of equity proceedings of the firm of R. D. Wood & Company in liquidation.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Trade News" columns.

To manufacture bronze, brass and iron goods—Johnson-Meier Company, Chicago, Ill. Capital $20,000. Incorporators: E. Johnson, C. A. Meier and W. P. Thornton.

To refine and smelt gold, silver and platinum—Hoover & Strong, 442-446 Niagara street, Buffalo, N. Y. Capital $20,000. Incorporators: H. A. Strong, J. F. and Sylvia T. Hoover.

To manufacture jewellers' supplies and equipment and dental supplies—Paul H. Gesswein & Company, Inc., 35 Maiden Lane, New York City. Capital $10,000. Incorporators: Paul H. Gesswein, president, and F. G. Burgmyer, secretary and treasurer.

To manufacture plain and fancy brass and steel chains—Universal Chain & Metal Stamping Company, 806-810 Greenwich street, New York. Capital, $10,000. Incorporators: Brinton Carrigan, president, Louis Loupot, vice-president, Charles Robertson, treasurer and Louis Arons, plant manager. This company has bought out the business of the United States Tool & Metal Stamping Company, formerly located at 442 Water street, New York, N. Y.

FOREIGN TRADE OPPORTUNITIES

For addresses of these enquirers apply to Bureau of Foreign and Domestic Commerce, Washington, D. C., and give file number.

No. 13938. **Zinc goods, etc.** An American-Portuguese firm in Europe advises an American consul that it wishes to establish agencies for American firms dealing in zinc goods and general novelties. References will be given. Correspondence may be in English.

No. 13948. **Tin.** An American consular officer in Italy transmits the name of a firm in his district which desires to secure from America cast iron, Eglinton I, Clarence III, Middlesboro, and very pure Straits tin.

No. 13949. **Lead and brass wire.** A firm in Europe advises an American consul that it wishes to secure from the United States lead and brass wire.

No. 13966. **Acetic Acid.** An American consular officer in Great Britain reports that a firm in his district desires to get in touch with American manufacturers of acetic acid.

No. 13976. **Zinc sheets and bronze powder.** An American consul in England transmits the name and address of a firm in his district which wishes to communicate with American manufacturers of zinc sheets and bronze powder, with a view to purchasing in considerable quantities.

No. 14018. **Cyanide of potassium.** An American consular officer in Mexico reports there is a demand in his district for cyanide of potassium for the treatment of ores.

No. 14073. Sheet tin.—A firm in South America has requested an American consular officer to furnish names of American manufacturers of sheet tin. Firms desiring to investigate this opportunity should communicate with the Bureau of Foreign and Domestic Commerce or its branch offices.

No. 14090. Zinc and chemical products.—A firm in southern Europe advises an American consul that it wishes to purchase zinc for photogravure, and chemical products.

No. 14097. Rolled gold plate and wire.—An American consul in England reports that a large firm in his district which has heretofore been purchasing large quantities of rolled gold plate and wire, etc., from manufacturers on the Continent, is prepared to take up an agency for American firms. References will be furnished.

INQUIRIES AND OPPORTUNITIES

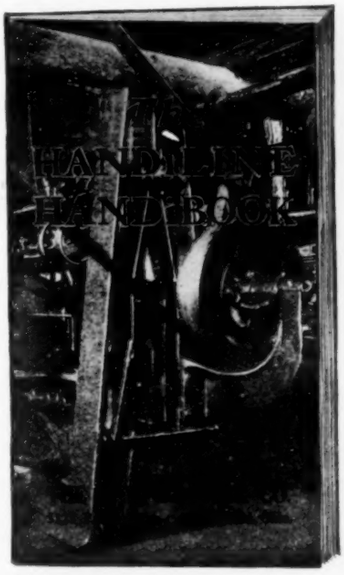
Under our directory of "Trade Wants" (published each month in the rear advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds, assists in the buying and selling of metals, machinery, foundry and platers' supplies, procures positions and secures capable assistants. See Want Ad. pages.

PRINTED MATTER

Rheostats.—The Crown Rheostat and Supply Company, Chicago, Ill., have issued a small folder giving illustrations, descriptions and prices of Crown rheostats which they manufacture. A complete description of these rheostas were published in THE METAL INDUSTRY for June, 1914.

Bearing Metal.—The Aluminum Castings Company, Cleveland, Ohio, issue a folder descriptive of Lynux-98, which is stated to be the hardest-service bearing bronze alloy on the market. It is also said that it is not only a superior alloy to begin with; but it is handled according to the most advanced foundry practice with absolute technical control. For this reason the physical properties of Lynux 98 are unusual and bushings made of it are claimed to stand up from two to five times longer than other makes.

Additional information regarding this alloy and Lynite, another product of this Company, may be obtained by addressing them as above.



THE OHIO BLOWER COMPANY'S NEW BOOKLET.

Sheet Metal Products.—A new booklet which contains many interesting suggestions in the line of specialties, constructed of sheet metal and angle iron for the use of factories and contractors, has just appeared off the press. This booklet, which contains a series of illustrations of the various products, describes the equipment and experience of The Ohio Blower Company which enables it to produce articles of this type of unusual durability at commercial prices. The articles illustrated include suggestions for the work room, stock room, and shipping room as well as for outside use. It will gladly be mailed free by The Ohio Blower Company, 5128 Perkins Avenue, Cleveland, Ohio.

CATALOG EXHIBIT

An exhibition of every kind of catalog may be seen at The Metal Industry office, 99 John street, New York. The Metal Industry is prepared to do all of the work necessary for the making of catalogs, pamphlets, circulars and other printed matter. Estimates will be furnished for writing descriptions, making engravings, printing, binding, for the entire job from beginning to end or any part of it.

METAL MARKET REVIEW

NEW YORK, November 2, 1914.

COPPER.

The copper market during the month of October has been saved by the export demand. Buying by home consumers has been very slow and only in small amounts and for immediate needs. The ammunition firms are busy with foreign orders. The wire business is very slow but the bulk of copper consumers have hardly done as well as in September.

The exports for the month total about 25,000 tons, and this is considered very good, and close to the normal export business. In September the exports were only 19,402 tons, while last October the exports were 29,239 tons. It is to be noticed that Italy has come in as a buyer since the shipments of copper to Holland were stopped by England, and now the British Government has held up the shipments to Italy. The American government will probably put in a protest and it will be up to the Italian Government to satisfy England that the copper will not be exported, before these shipments to Italy will be released.

Prices during the month have been gradually declining and the leading producers have been following declines from 11¾ down to 11½ delivered thirty days. There was very little business at any time and the smaller producers continued to cut prices. It may have been a case of "needing the money" with some of the companies; anyway, the price was down to around 11⅛ cash for electrolytic. Some few speculative export orders appeared in the market, and the decline in the price of copper seems to have been halted for the time being.

Some fair-sized sales were made by one of the largest producers at 11⅛ cash, but this only lasted for one day and then at 11¼ cash New York some good business was closed and producers advanced their price to 11⅜ cash, 11½ 30 days delivered. There is no business at the advance; there was really no warrant for any advance. The export movement has been unsettled by the action of the British government and there is not enough home demand to take up the surplus copper that some companies must continually sell.

The market at the close of the month is dull again and the indications are that 11¼ cash New York for electrolytic copper will be more than welcome to some of the companies that are today asking 11⅛. Lake is obtainable at 11½ and casting brands at 11¼ cash.

TIN.

The tin market has held fairly steady at around 30 to 31 cents. With the price of tin each day in London now cabled to the New York Metal Exchange, the tin market has become entirely nominal. The New York Metal Exchange is not officially open and no prices are made on the floor, but the trade is able to use the information each day.

The consumption during the month has been fairly good—3,800 tons—and the stocks are very favorable. Prices for 5 tons spot are about 30½ cents per pound, with the future months obtainable at a few points higher.

LEAD.

The trust reduced prices early in the month from 3.75 to 3.50, New York basis, and this is the price at the close. Business is very dull but prices are firm.

SPELTER.

The spelter market has held fairly steady at around 5⅛ to 5¼ cents New York. There is more inquiry for export to England, but the home market is very dull and prices are more or less soft. Sheet zinc has been reduced ½ cent per pound to 7½ cents at mill.

ALUMINUM.

The market is very dull and prices are about ¼ cent per pound lower. Ingots 98 to 99 per cent. pure are quotable at 18 to 18½ cents per pound against 18¼ to 18¾ a month ago.

ANTIMONY.

The antimony market has been up in the air again and prices are about 6 cents per pound above those ruling a month ago. Cooksons is quoted at around 16½ cents, Halletts 15¾, and Hungarian grade at 14 to 15 cents.

SILVER.

The silver market has been very weak and closes at about the lowest prices of the month. London is quoted at 22⅜d. and New York at 48½ cents, against 24d. in London and 53¾ cents in New York at the close of September.

PLATINUM.

Market has been very quiet and prices are about the same as a month ago—soft refined $48.00 to $50.00, with 10 per cent. hard at around $51.00 per ounce.

QUICKSILVER

Market has been dull and easier again, with the wholesale price today down to $47.50 per flask.

SHEET METALS.

The price of sheet copper was reduced in October ½ cent per pound to 16½ cents, copper wire around 12½ to 12¾ cents, and high sheet brass 12¾ base.

OLD METALS.

The market is very dull and unsatisfactory. With the foreign markets closed, prices here are weak and from ¼ to ½ cent lower than a month ago. The general cry is that "there is no business."—J. J. A.

OCTOBER MOVEMENTS IN METALS

	Highest.	Lowest.	Average.
COPPER			
Lake	12.25	11.50	11.90
Electrolytic	11.75	11.25	11.55
Casting	11.65	11.15	11.40
TIN	31.75	28.50	30.15
LEAD	3.75	3.50	3.60
SPELTER	5.25	5.05	5.15
ANTIMONY (Hallett's)	16.00	9.50	14.00
SILVER	52¾	48½	50.72

WATERBURY AVERAGE

The average price of Lake Copper per pound as determined monthly at Waterbury, Conn.:

1912—Average for year, 16.70 1913—Average for year, 15.83. 1914—January, 14.75; February, 15.125; March, 15.00; April, 14.875; May, 14.75; June, 14.375; July, 14.125; August, 13; September, 12,875; October, 12.5.

COPPER PRODUCTION

The Copper Producers' Association has decided not to issue any statement of the stocks of copper for the month of October. It is pointed out that the reduction of 50 per cent. in the refinery output that was put into effect in August will not show in the available supplies of copper until the month of November and it is quite probable that no statement of stocks will be published until the end of December.

DAILY METAL PRICES

We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the Official Daily Market Report of the Exchange and a year's subscription to THE METAL INDUSTRY for the sum of $10. The price of the Report alone is $10. Sample copies furnished for the asking. We can furnish daily telegraphic reports of metal prices. Address THE METAL INDUSTRY, 99 John street, New York.

Metal Prices, November 2, 1914

NEW METALS.

	Price per lb. Cents.
COPPER—PIG AND INGOT AND OLD COPPER. Duty Free. Manufactured 5 per centum.	
Lake, carload lots, nominal	11.50
Electrolytic, carload lots	11.25
Castings, carload lots	11.15
TIN—Duty Free.	
Straits of Malacca, carload lots	30.25
LEAD—Duty Pig, Bars and Old, 25%; pipe and sheets, 20%. Pig lead, carload lots	3.50
SPELTER—Duty 15%. Sheets, 15%.	
Western, carload lots	5.10
ALUMINUM—Duty Crude, 2c. per lb. Plates, sheets, bars and rods, 3½c. per lb.	
Small lots, f. o. b. factory	24.00
100 lb. lots, f. o. b. factory	21.00
Ton lots, f. o. b. factory	18.25
ANTIMONY—Duty free.	
Cookson's cask lots, nominal	18.00
Hallett's cask lots	16.50
Hungarian grade	14.50
NICKEL—Duty Ingot, 10%. Sheet, strip and wire 20% ad. valorem. Shot, Plaquettes, Ingots. Blocks according to quantity	.38 to .43
ELECTROLYTIC—3 cents per pound extra.	
MANGANESE METAL	.95
MAGNESIUM METAL.—Duty 25% ad valorem (100 lb. lots)	3.50
BISMUTH—Duty free	3.00
CADMIUM—Duty free	2.50
CHROMIUM METAL—Duty free	.75
COBALT—97% pure	2.00
QUICKSILVER—Duty 10%, per flask	$50.00
	Price per oz.
GOLD—Duty free	$20.67
PLATINUM—Duty free	50.00
SILVER—Government assay bars—Duty free	48½c.

INGOT METALS.

	Price per lb. Cents.
Silicon Copper, 10%.....according to quantity	25 to 28
Silicon Copper, 20%..... " "	28 to 32
Silicon Copper, 30% guaranteed " "	30 to 34
Phosphor Copper, guaranteed 10% "	24 to 28
Phosphor Copper, guaranteed 15% "	25 to 29
Manganese Copper, 25%..... " "	25 to 29
Phosphor Tin, guaranteed 5%. " "	57 to 60
Phosphor Tin, no guarantee.. " "	36 to 39
Brass Ingot, Yellow..... " "	8 to 9½
Brass Ingot, Red..... " "	11 to 12
Bronze Ingot ..... " "	10½ to 11¼
Manganese Bronze Ingots.... " "	17 to 18½
Phosphor Bronze ..... " "	18 to 20
Casting Aluminum Alloys.... " "	16 to 18

PHOSPHORUS—Duty free.
According to quantity..... 30 to 35

OLD METALS.

Dealers' Buying Prices. Cents per lb.		Dealers' Selling Prices. Cents per lb.
9.50 to 10.00	Heavy Cut Copper	11.25 to 11.50
9.25 to 9.50	Copper Wire	10.75 to 11.00
8.50 to 8.75	Light Copper	9.75 to 10.00
9.00 to 9.25	Heavy Mach. Comp	10.25 to 10.50
7.25 to 7.50	Heavy Brass	8.50 to 8.75
5.25 to 5.50	Light Brass	6.50 to 6.75
7.00 to 7.25	No. 1 Yellow Brass Turnings	7.50 to 7.75
7.50 to 8.00	No. 1 Comp. Turnings	8.75 to 9.25
3.00 to ——	Heavy Lead	—— to 3.25
3.75 to ——	Zinc Scrap	—— to 4.00
5.50 to 6.50	Scrap Aluminum Turnings	6.00 to 7.00
11.50 to 12.00	Scrap Aluminum, cast alloyed	12.00 to 13.00
13.00 to 14.00	Scrap Aluminum, sheet (new)	13.00 to 14.00
23.00 to 24.00	No. 1 Pewter	25.00 to 26.00
17.00 to 23.00	Old Nickel	17.00 to 23.00

PRICES OF SHEET COPPER.

BASE PRICE, 16½ Cents per Lb. Net.

SIZE OF SHEETS. Width.	LENGTH.	64 oz. and over.	32 oz. to 64 oz.	24 oz. up to 32 oz.	16 oz. up to 24 oz.	15 oz.	14 oz.	13 oz.	12 oz.	11 oz.
		Extras in Cents per Pound for Sizes and Weights Other than Base.								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	½	1	1½	2	2½
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	½	1	2	3	4½
	Longer than 96 inches. Not longer than 120 inches.	"	"	½	1	2	3	5	7	
	Longer than 120 ins.	"	"	1	1½					
Wider than 30 ins. but not wider than 36 inches.	Not longer than 72 inches.	"	"	Base	Base	1	2	3	4	6
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	2	4	6	8
	Longer than 96 inches. Not longer than 120 inches.	"	"	1	2	3	4			
	Longer than 120 inches.	"	1	2	3					
Wider than 36 ins. but not wider than 48 inches.	Not longer than 72 inches.	"	Base	1	2	3	4	6	8	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	4	5	7	9	
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	6	9			
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins. but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	5	7	9	11	
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	7	10			
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Longer than 120 inches.	3	5	9						
Wider than 108 ins., but not wider than 120 ins.	Not longer than 120 inches.	4	6							

The longest dimension in any sheet shall be considered at its length.

CIRCLES, 8 IN. DIAMETER AND LARGER, SEGMENTS AND PATTERN SHEETS, advance per pound over prices of Sheet Copper required to cut them from ..... 3c.

CIRCLES LESS THAN 8 IN. DIAMETER, advance per pound over prices of Sheet Copper required to cut them from ..... 5c.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot and heavier, advance per pound over foregoing prices ..... 1c.

COLD OR HARD ROLLED COPPER, lighter than 14 oz. per square foot, advance per pound over foregoing prices ..... 2c.

COLD ROLLED ANNEALED COPPER, the same price as Cold Rolled Copper.

ALL POLISHED COPPER, 20 in. wide and under, advance per square foot over the price of Cold Rolled Copper ..... 1c.

ALL POLISHED COPPER, over 20 in. wide, advance per square foot over the price of Cold Rolled Copper ..... 2c.

For Polishing both sides, double the above price.

The Polishing extra for Circles and Segments to be charged on the full size of the sheet from which they are cut.

COLD ROLLER COPPER, prepared suitable for polishing, same prices and extras as Polished Copper.

ALL PLANISHED COPPER, advance per square foot over the prices for Polished Copper ..... 1c.

ZINC— Duty, sheet, 15%. Cents per lb.
Carload lots, standard sizes and gauges, at mill.....7.50 basis, less 8%
Open casks, jobbers' prices ..... 8½c.
Casks, jobbers' prices..... 9c.

Metal Prices, November 2, 1914

PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect November 2, 1914, and until further notice.

To customers who buy over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.12¼	$0.13⅝	$0.14½
Wire	.12	.13⅝	.14½
Rod	.12	.14⅝	.15½
Brazed tubing	.16	——	.18¾
Open seam tubing	.16	——	.18¾
Angles and channels, plain	.16	——	.18¾

50% discount from all extras as shown in Brass Manufacturers' Price List.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass	½c.	per lb. net advance
" —Best spring, drawing and spinning brass	1½c.	" " " "
Wire—Extra spring and brazing wire	½c.	" " " "
" —Best spring and brazing wire	1c.	" " " "

To customers who buy 5,000 lbs. or less per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.13½	$0.14⅞	$0.15¾
Wire	.13¾	.14⅞	.15¾
Rod	.13¾	.15⅝	.16¾
Brazed tubing	.17¼	——	.20
Open seam tubing	.17¼	——	.20
Angles and channels, plain	.17¼	——	.20

Net extra as shown in Brass Manufacturers' Price List.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass	½c.	per lb. net advance
" —Best spring, drawing and spinning brass	1½c.	" " " "
Wire—Extra spring and brazing wire	½c.	" " " "
" —Best spring and brazing wire	1c.	" " " "

BARE COPPER WIRE—CARLOAD LOTS.

12½c. per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order	18c.	per lb. base
100 lbs. to 300 lbs. in one order	18½c.	" " "
Less than 100 lbs. in one order	20c.	" " "

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 8½ O. D. Nos. 4 to 13 Stubs' Gauge, 15c. per lb.
Seamless Copper Tubing, 18½c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron pipe sizes with price per pound.

⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
23	22	17	16	15	15	15	15	15	15	15	16	17	19	21	22

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet Brass.	Bronze.
⅜ inch	$8	$9
½ inch	8	9
⅝ inch	10	11
¾ inch	12	13
⅞ inch	14	15
1 inch	18	20
1¼ inch	22	24
1½ inch	25	27
1½ inch	32	35
1¾ inch	45	48
2 inch	56	69

Discount 55-5%.

PRICE FOR TOBIN BRONZE AND MUNTZ METAL.

Tobin Bronze Rod	16½c.	net base
Muntz or Yellow Metal Sheathing (14" x 48")	13c.	" "
" " " " Rectangular sheets other than Sheathing	15½c.	" "
" " " " Rod	13c.	" "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bar in the rough, 21c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturers.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Sheet Block Tin—18" wide or less. No. 26 B. & S. Gauge or thicker. 100 lbs. or more 5c. over Pig Tin. 50 to 100 lbs. 6c. over, 25 to 50 lbs. 8c. over, less than 25 lbs. 10c. over.

No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more 4c. over Pig Tin. 50 to 100 lbs. 5c. over, 25 to 50 lbs. 7c. over, less 25 lbs. 9c. over.

Above prices f. o. b. mill.

Prices on wider or thinner metal on request.

PRICE SHEET FOR SHEET ALUMINUM—B. & S. Gauge.

Gauge.	Width. Inches.	1 ton.	500 lbs.	50 lbs.	Less than 50 lbs.
20 and heavier	3-30	30c.	34c.	36c.	38c.
	3-30	32c.	35c.	37c.	39c.
21 to 24 inclusive	30-48	33c.	37c.	39c.	41c.
	48-60	39c.	40c.	42c.	44c.
25 to 26	3-30	33c.	36c.	38c.	40c.
	30-48	35c.	38c.	40c.	42c.
27	3-30	36c.	37c.	39c.	41c.
	30-48	39c.	40c.	42c.	44c.
28	3-30	37c.	38c.	40c.	42c.
	30-48	40c.	41c.	43c.	45c.
29	3-30	38c.	39c.	41c.	43c.
	30-48	42c.	43c.	45c.	47c.
30	3-30	39c.	40c.	42c.	44c.

The above prices refer to lengths between 2 and 8 feet. Prices furnished by the manufacturers for wider and narrower sheet. No charge for boxing. F. O. B. Mill.

PRICE LIST SEAMLESS ALUMINUM TUBING.

STUBS' GAUGE THE STANDARD. SIZES CARRIED IN STOCK.
Outside Diameters. **BASE PRICE, 24 Cents per Pound.**

Stubs' Gauge.	Inches.	¼ in.	5-16 in.	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1¼ in.	1½ in.	1¾ in.	2 in.	2½ ins.	3 ins.	3½ ins.	4 ins.	4½ ins.
11.	.120.	..	..	..	..	..	..	..	26	23	..	..	13	19	9	8	15	22
12.	.109.	..	..	..	..	..	..	..	25	..	..	..	14	..	..	..	..	..
14.	.083.	..	..	..	..	..	..	..	..	..	..	..	16	..	..	..	..	..
16.	.065.	..	..	..	..	..	27	26	26	23	22	20	20	20	20	26	30	36
18.	.049.	..	..	..	..	32	29	28	27	24	25	25	25	..	..	..	..	..
20.	.035.	116	..	45	38	33	32	31	29	28	29	29	29	30	37	48	57	80
21.	.032.	..	..	..	39	..	..	..	..	..	..	..	..	..	..	..	..	..
22.	.028.	137	97	47	41	37	36	34	33	..	..	44	..	..	..	..	..	..
24.	.022.	187	132	107	87	78	72	61	59	65	..	..	..	..	..	..	..	..

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

Diameter. B. & S. G'ge	000	No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price per lb.	33	33½	33½	34	34½	35	35½	36	37	38	39	44	47	

BASE PRICE GRADE "B" GERMAN SILVER SHEET METAL.

Quality.	Net per lb.	Quality.	Net per lb.
5%	18¼c.	16%	22¾c.
8%	20c.	18%	23¼c.
10%	20½c.	20%	25½c.
12%	21½c.	25%	33¾c.
15%	22½c.	30%	39¾c.

GERMAN SILVER WIRE.

Quality.	Net per lb.	Quality.	Net per lb.
5%	19¼c.	15%	26½c.
8%	21c.	16%	27½c.
10%	22½c.	18%	29¼c.
12%	24½c.	30%	45¼c.

The above Base Prices are subject to additions for extras as per lists printed in Brass Manufacturers' Price List and from such extras 50% discount will be allowed. The above base prices and discounts are named only to wholesale buyers who purchase in good quantities. Prices on small lots are considerably higher.

PRICES OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quantity and market conditions. No fixed quotations can be given, as prices range from 1c. below to 4c. above the price of bullion.

Rolled silver anodes .999 fine are quoted at 2½c. to 3½c. above the price of bullion.